Change in management accounting in UK universities during the 1990s

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ABSTRACT

Change in Management Accounting in UK Universities during the 1990s

Martin John Broad

This thesis analyses a failed attempt to implement an Activity Based Costing system within a specific UK university. Following a detailed case study review of this implementation, a number of specific organisational factors, and other more general issues are identified as the main reasons for failure. The thesis progresses to consider the application of Contingency Theory to the developments of accounting systems within the UK university sector during the 1990s.

The thesis reveals the complex inter-relationships between various contingent variables and accounting systems developments using Multi-Dimensional Scaling analysis. The findings suggest that Contingency Theory does have an explanatory effect on the evolution of accounting systems, but specifically this is found to apply to only one section of the UK university sector (those former polytechnics that obtained university status in 1992 under Royal Charter in 1992). The specific application of Contingency Theory to only one section of the university sector is rationalised and it is suggested that the financial pressures within the university sector during the 1990s were the catalyst for change in the former polytechnic sector due to their historic over reliance upon teaching funds from the Higher Education Funding Councils.

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CHAPTER ONE

Introduction

This research is in the area of cost and management accounting within the UK university sector.

A number of organisational and external environmental changes took place in the university sector during the 1990s. These changes had a profound effect on many universities and this research was started after a project group, including the author of this thesis, failed to implement a new costing system during the mid 1990s, which used the principles of activity based costing to cost courses. The activity based costing system was developed in response to the request by the University management of Fernleigh[1] University. The author sought to understand the reasons why the project group failed to implement the new costing system and used his position of employment to understand the issues that arose through a detailed case study analysis of the University.

The case study illustrated a number of organisationally specific factors such as power, politics and a perceived over-complexity of the activity based costing model that resulted in its failure. Whilst this was interesting in itself, it did not really tackle the reason why the activity based model was replaced by a much more simplified system that sought to cost the academic school rather than the courses within it. After much

[1] Fernleigh University is a fictitious name which has been used to disguise the actual university due to the confidential nature of the initial section of this research.

sole searching on the issue of why a school costing system replaced a course-costing model, it was decided to survey the university sector in an attempt to capture what other universities had been doing during the 1990s.

There was very little research into accounting systems development within the UK university sector and the experience gained from the failed attempt to implement a new costing system within Fernleigh University raised a series of questions, such as: -

- Why a school costing system was preferred to a course-costing model?
- How could a school costing system aid decision-making within the academic school?
- Was Fernleigh University unique in its approach to develop a course costing system, and if so why?
- Were there any general, critical factors that impinged upon costing system developments within this University that could be generally transferable to the university sector?

These questions could not be answered from the extant literature on activity based costing or alternative costing systems as many of the references were found to relate to the manufacturing sector. The specific literature relating to the university sector was also sparse. There was a clear need to advance knowledge in this area; not necessarily to identify the most appropriate costing system for universities per se, but to understand, more generally, the phenomenon that had been experienced.

Following the detailed case study in section one of this thesis, the research was broadened to evaluate the accounting developments that had taken place during the

1990s by UK universities. A contingency theory framework was developed and a questionnaire was developed to capture what changes had taken place during the 1990s. The areas of change were classified as the external environment, market research activities and the internal operating authority of the universities. In association with these, a number of accounting information system characteristics were evaluated with the intention of understanding the evolution of the accounting systems with regard to the contingent factors.

Therefore the thesis has two sections; the first deals with the literature, methodology and analysis of the case study and the second section caters for the literature, methodology and analysis of the survey approach.

A questionnaire for the latter section of the thesis was developed in response to a lack of detailed understanding of how accounting systems had evolved in the university sector. To help develop the questionnaire, the contingency theory literature was examined. Initially this concentrated on the work of Gordon and Miller (1976) because it was felt that their methodology and archetypal development would provide a solid foundation for advancing this thesis. However, to avoid being too narrowly focussed on the Gordon and Miller research, in case their findings could not be replicated in the university sector, the broader contingent literature was also examined and aspects of it built into the questionnaire.

The Gordon and Miller methodology used three key terms to measure how elements of the environment had changed. These terms had, however, inherent difficulties in application through the medium of a questionnaire. The three specific elements of the

environment (as per Gordon and Miller) were dynamism, heterogeneity and hostility and Gordon and Miller (1976) argued that these clustered to form archetypes of firms. However, a questionnaire approach made it impossible to individually measure, for example, the dynamism of the university environment as a single and separate variable, and this dilemma applied equally to heterogeneity and hostility. This is described in detail in Chapter Seven. Therefore the statistical analysis of the data had to recognise this limitation and this issue added weight to evaluating the broader contingent variables in the questionnaire (external environment, market research and internal operating authority).

The questionnaires were sent to three key positions within every UK university. The academic head of a business related department (with accounting as a main discipline), the academic head of a non-business related department (for example, physics) and the general university management (finance director) were each sent an individual questionnaire. This research aimed to probe deeply into the universities, to understand whether the composition of the academic department had any impact on the design, or use, of the accounting systems and whether there was any difference between the polytechnic and university sectors (referred to as 'new' and 'old' universities herein). The general university management was selected in addition so that an holistic view of changes within the universities could be obtained and thus compare this with the viewpoints of the academic departments.

Two academic departments (business and non-business) were selected because the findings from the case study suggested that the accounting knowledge of some heads of non-business related departments was questionable. Thus, surveying both department

types would enable some comparative analysis to be undertaken which might be explained by the difference of accounting knowledge. The general university management provided an overarching strategic view of the university and this enabled further comparative analysis to be undertaken with the data.

The data was analysed through SPSS[2] where it was subject to rigorous investigation. The initial statistical analyses concentrated on basic frequency distribution and chi-squared cross-tabulation tests to identify any significant differences between the 'new'/ 'old' universities and the academic departments. The mainstay of the statistical study was, however, thoroughly to interrogate the dataset and apply the contingency theories to the university sector. This would help to understand why accounting systems had developed in the way they had, given the contingent changes (external environment, market research activities and internal operating authority) that had occurred in the university sector.

To understand the complex relationships within a university and the developments of its accounting systems required a sophisticated statistical test. The extant literature tended to use cluster analysis with regression analysis to identify the more statistically significant variables. This approach assumed, however, the data did form clusters that explained accounting system evolution, yet there was no justification for this assumption to be made in this research. Therefore, rather than force this assumption on the data it was decided to use a technique that allowed relationships and common configurations to form as appropriate from the data. Furthermore, the relationships and common configurations may not only form in two dimensions (as in the case of cluster

analysis). Therefore the statistical technique that was used allowed these relationships and common configurations to form in multiple dimensions using a technique referred to as Multi-Dimensional Scaling (MDS). As a forerunner to the MDS analysis, a more traditional statistical data reduction technique (Factor Analysis) was used to help understand some of the more important relationships in the dataset.

The statistical interpretation of the data concentrated on four aspects:-

- Basic frequency and cross-tabulation analysis.
- Factor Analysis and MDS (across the 'new'/ 'old' universities and the two types of academic departments) based on the external environmental questions and accounting system changes to draw conclusions about the applicability of the Gordon and Miller (1976) findings.
- Factor analysis and MDS (across the 'new'/ 'old' universities and the two types of academic departments) based on the broader range of contingent variables and accounting system changes to draw conclusions from the wider contingent literature.
- Factor analysis and MDS (across the general university management) based on the broader range of contingent variables and accounting system changes to draw conclusions from the wider contingent literature.

The general analysis showed that there had been significant differences in the ways the 'new'/ 'old' universities and types of academic departments, had reacted to the external environmental changes. The conclusions drawn from here were not wholly supportive

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[2] Version 10.0

of the work of Gordon and Miller (1976), although some parallels were evident as are discussed in Chapter Eleven.

The second MDS analysis contradicted part of the above account and the academic department type proved to be no longer significant. The broader range of contingent variables (external environment, market research and internal operating authority) appeared to affect the academic departments in much the same way, although the status of the university was still significant.

Overall it was shown that the internal organisational variables (internal operating authority) weighed much more heavily than the external environmental variables as explanatory elements of accounting system developments, and this was confirmed through the final MDS analysis, where once again the university status ('new' or 'old') was significant.

Overall, the conclusions drawn were that: -

- The contingent variables do partly explain the accounting systems developments of UK universities, particularly in the 'new' university sector,
- It is possible to rank the contingent variables in order of importance of their impact on accounting systems development with internal organisational variables having a much larger impact on the accounting system changes than the external environmental variables,
- There appears to be a further explanatory factor in determining the evolution of accounting systems between the 'new' and 'old' university sectors. This is referred to as an external shock and is discussed in Chapter Thirteen.

The conclusions from the second section of this thesis helped to rationalise the journey that Fernleigh University travelled and showed that the evolutionary process of accounting systems was more likely to have occurred in the 'new' university sector. The analysis of the questionnaire data showed that there were developments along the lines of course costing (or more widely termed activity costing, which included research), but much more widespread was the notion of school-costing.

This thesis sets out to provide a detailed, logical and structured account of the developments of accounting systems within UK universities during a changing financial scene in the 1990s.

CHAPTER TWO

The changing financial scene in UK universities in the 1990s

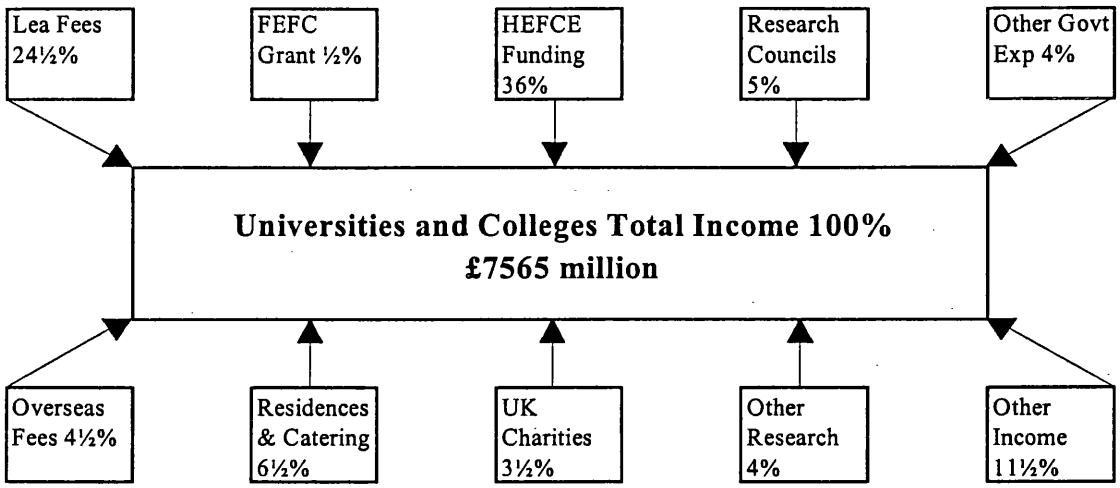
Changes to the higher education sector during the 1990s came from a variety of sources. These impacted upon students through grant levels being frozen at the 1989/90 levels, a student loan company being set up to provide additional funding up to a maximum level decided by government and further reductions in available finance by, for example, housing benefits being abolished for students living away from home.

Substantial changes also took place in the market place for students and competition increased between universities as they rapidly expanded to cope with the government's strategy of increased student numbers entering higher education. Furthermore, funding arrangements for teaching underwent changes; research assessment exercises became increasingly competitive; and quality assurance of education became much more important.

2.1 Changes to funding arrangements

Universities in the United Kingdom receive the vast majority of their funding from the Higher Education Funding Councils of England, Wales, Scotland or Northern Ireland. By way of an example, in England, the Higher Education Funding Council (HEFCE) provided 36% of universities and colleges total income in 1993/4 through block funding (a college also received funding from HEFCE if it provided higher education courses). A further 24½% came from the Local Education Authority and the balance was made up of overseas income, research income and various other sources (Figure 2.1).

Figure 2.1: Main sources of funding For Higher Education Institutions (England) in 1993/1994. Source: HEFCE M13/95



LEA: Local Education Authority
FEFC: Further Education Funding Council
HEFCE: Higher Education Funding Council for England

As Figure 2.1 shows, the UK government provided nearly 65% of universities' income in 1993/94 (LEA, HEFCE and Other Govt. Exp.). In some 'new' universities that did not have a strong track record in research or external funding, the proportion of government funding, as a percentage of total income, would be significantly higher. In fact, about twelve universities received just over 60% of all the grants awarded by the Research Councils and these also took a large element of the post-graduate research awards as they were perceived as centres of excellence for such study and therefore attracted large numbers of postgraduate students.

Being reliant on government funding to such an extent had important consequences for developing a strategy for growth and survival. Through increases in government funding, expansion plans could be created and started. Such plans could not, however,

always be guaranteed to completion if the government changed its policy on funding as was the case in the early 1990s.

In May 1991 the Government produced a White Paper entitled 'Higher Education: A New Framework'[3] which set out proposals to achieve a participation rate (age participation rate – APR) of one in three people aged 18-21 years to attend higher education by the year 2000. This was an increase on the previous figure of one in four (as at 1991).

Over the previous fifty years or so, the university sector had grown from 50,000 students in British universities in 1939 to nearly 750,000 in 1991. With the White Paper pursuing an increase on this figure then, using simple figures, the number of students would be set to increase from nearly 750,000 students (one in four) to approximately 1 million (one in three) by the year 2000.

By 1993/4 the number of 18-21 year olds attending a place at university had nearly reached the government's target of one in three. This had been mainly due to a number of new universities undergoing rapid expansion to take advantage of the increase in potential students through new courses that were predominantly vocational, and/or more students on existing courses. The traditional universities had undergone expansion as well, but not at such a terrific pace[4].

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[3] Cm. 1541

[4] 'Budget changes at universities boost class sizes by 50%', The Times, 22nd August 1994, pg. 7

As the Conservative Government could not sustain this growth at such a rapid pace, a 'policy of consolidation' was implemented in Autumn 1993 to prevent public spending on higher education escalating out of control. Thus the HEFCE was given the task of controlling the number of students whose fees were paid by the LEA. This resulted in an upper limit being imposed on universities as to the number of students they could recruit, as well as a financial penalty if they over/ under recruited by more than a very small percentage (1% of target recruitment in 1994/5). This meant that the amount of funding available for growth from the HEFCE was severely reduced as this was, now, contrary to government policy.

The government's policy of consolidation also affected the level of tuition fees paid by the LEA in 1994/5. This reduction was however compensated by the government through an increase in the block funding to the HEFCE of £647 million. This was then distributed to all universities to offset the fee reduction. However, as this block funding was distributed according to courses being run, as opposed to a head count, there were inevitably some winners and losers

Prior to 1994, the LEAs paid higher education establishments tuition fees based on, what was termed, band one and band two students[5]. Put simply, a band one student was enrolled on an Arts degree and a band two student on a Science degree. The band two student would probably make use of specialist laboratories and their course of study would be more practically oriented than a band one course, e.g. an engineering design degree would be classified as a band two course whereas a law degree would be classified as a band one course and in order to facilitate the cut back in expansion there

was a differential fee reduction of these bands (Heald and Geaghan, 1994). Band two courses attracted more revenue than band one and so the inevitable loser institutions, as alluded to earlier, would be those who had the majority of courses in the band one area.

The fee compensation of £647 million, which the government allocated to the HEFCE was, as mentioned above, distributed to all universities together with the main funding. The HEFCE distributed this money based on a formula, whose complexity is not required to understand the process in full. However, the HEFCE used 'funding cells', which were produced from eleven academic subject categories, two modes of study and two levels of study to allocate the majority of its funds (Appendix 1). Thus depending on the type of courses being offered at a university the amount of fee compensation could have led to an increase or decrease in the overall level of funding received.

For the academic year 1998/9 the funding allocation changed once more. Instead of there being a fee banding dependant upon the type of course being offered, a new structure was introduced. Four cost centre revenue streams were introduced with different revenues attached to each stream. However, whilst the funding had changed so had the manner in which it was calculated. For instance, a degree programme may have comprised a number of elements, some of which would fall into the old band one and some into the band two definitions. Instead of receiving the full amount of band two funding a degree programme would receive a proportion of cost centre funding (A to D) depending on how is was compiled. The old band one courses, such as law were reclassified to cost centre D with a further reduction in funding. Thus, for example,

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[5] The banding included a third for students involved in health studies. Correct as at 1st September 1997

universities with a significant proportion of cost centre D courses experienced further financial pressures.

The funding arrangements for research also changed during the 1990s. The dual funding system, which distributed funds from the Funding Council as a block grant and from the Research Council via grants and contracts, saw some funds being transferred from the block grant to specific grants and contracts and therefore general funds for research were reduced. The research assessment exercises (1992, 1996) also became inputs into the way in which research funds were distributed within the sector and increased competition for a finite amount of funding.

Towards the end of the 1990s the separate funding arrangements for teaching and research required all universities to account for these separate streams of revenues and costs under the Transparency Review. The Transparency Review was a report that required all higher education institutions to implement 'a uniform approach to the costing of research, teaching and other activities' (HEFCE, 1999) by January 2002 and was backed by the UK higher education Joint Costing and Pricing Steering Group.

2.2 Other changes affecting universities

Change also came about through the government abolishing the, so-called, binary divide between universities and polytechnics, which effectively meant that all higher education establishments could be called universities[6]. Therefore, there were what became to be known as 'old' universities and 'new' universities, or pre- and post- 1992 universities.

Additionally the Quality Assurance Agency (QAA)[7] had statutory powers to formally evaluate the procedures and teaching methods of universities. This evaluation process marked the universities out of a score of twenty four (over six key areas) and this mark, being within the public domain, became a yardstick of quality across the sector.

The Dearing Report (1997) gave a comprehensive review of the higher education sector and with this came the government's decision to introduce further changes; for example, the introduction of student fees, the abolishment of the maintenance grant and targeted lifting of the restriction of students on undergraduate courses.

2.3 Conclusion

The changes that took place within the university sector during the 1990s were significant and substantial in nature. The changing environment might have been expected to lead to changes in management control and the development of more effective management accounting information systems. Yet, as this thesis will demonstrate, the changes within one university were difficult to make; although there is evidence of change within the sector as a whole.

The next two chapters consider the review the literature pertaining to that part of the research and the research methodology for the case study analysis. The case study is detailed in Chapter Five and a discussion then follows before the second stage of the research is considered.

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[6] Subject to meeting a minimum criteria as defined by the Further and Higher Education Act 1992
[7] The QAA came into existence in August 1997 and was responsible for the quality assurance and quality assessment functions of the Higher Education Quality Council and the HEFCE.

CHAPTER THREE

A review of the literature

This chapter turns to various sources of literature to identify relevant information available to support the research in terms of understanding the implementation issues of new costing systems and more appropriately those using activity based costing principles.

The literature review considered three main areas:-

- An initial search considered the specific issues relating to university costing systems, although this was not too fruitful as little had been written, specifically, about them.
- The second area concerned itself with the field of 'activity based costing' (ABC) and 'implementation'. ABC was referred to in detail for two reasons. First, the principles of this costing technique were used within Fernleigh University and the literature might provide knowledge that would assist in understanding why the costing system failed to be implemented. Secondly, as ABC is a fairly complex accounting concept, it was felt that parallels could be drawn with this and the attempted implementation of other equally complex costing techniques. This search provided a number of interesting articles/ studies that will be discussed below.
- Third, references were considered from the change management literature as this would provide a further avenue of support to analysing the process of implementing a new costing system within the case study University.

3.1 University related literature sources

The literature contains a few short articles in professional journals discussing the issues affecting costing generally in universities, although Mitchell (1996) has conducted research into ABC in UK universities. Mitchell's research into the extent of ABC in UK universities showed that 'one fifth of [universities] had made use of this costing method, and were overwhelmingly positive about it's benefits ... most institutions viewed ABC as a tool for rational allocation of central costs to academic departments' (pp. 51).

However, on closer scrutiny, it would appear that the definition of what ABC entailed differed across the university sector[8]. As expected, some institutions used the literal meaning of ABC, looking at activities and what drives them. Others, however, used a mixture of activities and multiple absorption bases.

Activity based costing was developed by Cooper and Kaplan (1987) in response to the perception that traditional overhead absorption on one basis, usually labour hours, was distorting product costs as the cost profiles in organisations were becoming more complex. Using labour hours as a measure of absorbing overheads, when labour costs could be the lowest percentage cost in an organisation meant that the absorption basis was very top heavy and this could lead to inaccurate product costs being calculated. ABC was devised to provided enhanced product costing (Cooper and Kaplan, 1987; Roth and Borthick, 1989) by identifying the activities that an organisation undertakes, identifying those overhead costs that are incurred as a result of those activities and apportioning costs to products on the basis of the activities that are incurred to produce

[8] A small number of telephone calls were made to universities following this publication to see if they were using ABC. It transpired that many were in fact using a multiple absorption basis and not ABC

it. Therefore, for example, a simple product manufactured on a long production run would incur less overhead costs than a complex product produced in short production runs even if the labour content was the same.

Not only does this technique state that enhanced product costs could be calculated, but also that this approach provides more relevant information for management decision making (Cooper and Kaplan, 1988) by targeting management's attention towards those activities which are expensive or are not providing any added value to the process. Coupled with this was the claim that it also aids performance evaluation (Berliner and Brimson, 1988).

ABC as a concept has been extensively written about over the years (see for example Cooper and Kaplan, 1988; Turney, 1990; Bhimani and Piggot, 1992). There are also a number of articles within the professional literature (for example, the Chartered Institute of Management Accountants (CIMA) journal 'Management Accounting'[9]) that are still referring to, and recapping on, the basics. This may suggest that those who are interested in it (i.e. many practitioners), are unclear as to what it is, or how it can be used.

As there does not seem to be a consensus on what ABC entails in practice (in universities) then a wider definition needed to be drawn which would encompass partially activity based and also traditional overhead absorption techniques. Thus, ABC is a term used to encompass the technique of absorbing overhead costs of universities

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although on first questioning they suggested they were using ABC. In reality they were using a hybrid somewhere between traditional absorption costing and activity based costing.

[9] Renamed 'Financial Management' in 2001

on either activities, or a mixture of activities and traditional bases. In this context, the wider definition is taken to include the specific meaning that Kaplan (1994) advocated and a multi-driver absorption technique. This wider definition of ABC does not detract from the core of this research as for some universities there is not a need to improve the costing system by moving to an activity based system, but to create a costing system in the first place that provides appropriate financial data (Cooper, 1990).

Mitchell's (1996) work showed that the majority of universities using ABC saw 'the objective as being to allocate overheads to academic schools, with only a minority concerned with the costing of courses' (*ibid*, pp.55). This was an interesting insight in itself, as one of ABC's main objectives is to produce a more accurate product/ service cost than the traditional methods currently did using one absorption basis. However, there is evidence in the literature to support the view that some organisations do not consider the main benefit to come from more accurate product costs, but from the 'attention directing aspect for strategic purposes' (Innes and Mitchell, 1991, pp. 26).

Innes and Mitchell's comment concerns itself with using the cost driver information from an ABC project to target attention at those activities that are incurring significant costs, thereby, in time, being able to streamline the activities, or eliminate them, which in turn will dispense with the associated overhead cost. This is a particularly useful feature of ABC, which could not be identified through traditional methods of overhead cost absorption. For example, if using the traditional method, labour hours was the preferred overhead absorption basis then simply reducing the number of labour hours would not necessarily reduce the overhead cost to be absorbed. In reality what would happen is that the overhead absorption rate per labour hour would increase as the

numerator of the equation remains constant and the denominator reduces. With ABC, through targeting attention at the activity, it would be possible to reduce the overhead cost associated with it if the activity could be streamlined. One of the assumptions behind ABC is that all costs are variable in the longer run so if the activity is eliminated then all the fixed costs associated with that activity would also be eliminated.

Mitchell's (1996) research indicated that 70% of universities that had considered ABC had positive views of it and he conjectured that the remaining 30% may well have once they had given the costing method due consideration. It would, however, be reasonable to assume that if there was an element of confusion as to what ABC entailed in universities, then a positive view of something one did not fully comprehend was a tentative conclusion on which to base his conjecture.

3.2 Activity Based Costing implementation

In other literature sources there are a number of case studies that analyse the implementation of new costing systems, such as ABC, and provide useful insights into those factors.

Innes and Mitchell (1991) argued that managers within the organisation need to accept the value of ABC in its own right and this is a process in itself that needs to be carefully managed. Innes and Mitchell's research indicated that if managers were willing and enthusiastic about a technique then they would take ownership of the concept and seek to see it through to the end. This would seem reasonable, but it is the process of ensuring the managers do take ownership and become enthusiastic about the new technique that requires careful management and skills.

Shields (1995) supports the findings from Innes and Mitchell (1991) and provides further evidence that there are a number of other implementation factors that are correlated with ABC success. Shields suggests that 'ABC success is associated with behavioural and organisational implementation variables' (pp. 163) and these are identified as being 'top management support; linkage to competitive strategies; particularly quality and JIT/ speed; linkage to performance evaluation and compensation; training in implementing ABC; nonaccounting ownership; and adequate resources' (pp.163). These variables provided the largest explanation of the variance (in Factor Analysis) that existed within the complete set of implementation variables that were considered (17 in total) and it was interesting to note that Shields identified that the technical implementation variables were not highly explanatory of successful implementation. Thus it would appear that the behavioural and organisational variables should have much more attention directed towards them rather than the technical implementation variables.

On a more practical basis, a number of research papers identified perceived problems and benefits of using activity based costing. The perceptions were of those who had considered ABC and related to agreeing cost drivers, time, cost of the exercise and lack of knowledge. These problems that were identified by a series of authors (Innes and Mitchell, 1991; Cobb *et al*, 1992; Argyris and Kaplan, 1994) were, however predominantly set in manufacturing organisations.

One may argue that cost drivers are more difficult to identify in universities or that ABC is not appropriate in universities (Broad and Crowther, 2001), but, Turney (1990)

suggests that these perceived problems are purely myths, i.e. they are accepted as problems without 'critical analysis'. He states that '[his] experience shows ... that most people over-estimate the incremental costs of tracking and data gathering for ABC systems' (pp.25).

Turney also suggests that 'ABC systems are easy to understand' and the perception that they are difficult to understand is not reflected in 'the experience of firms that have implemented such systems' (*ibid* pp.26). Whilst his research has stated that these myths are commonly held views, one may argue that they may not necessarily be valid. His suggestion that 'ABC systems are easy to understand' may come from an accountant's perspective. Turney seems to be stating that so long as sufficient time is devoted to analysing the logic behind the drivers and how the costs are compiled, then this is far more transparent and therefore understandable than an absorption of overheads based on, say labour hours, which does not provide an understanding of how costs are incurred.

Additionally, Bhimani and Pigott (1992, pp.120), acknowledged that there are aspects of 'behavioural, organisational and social factors that are likely implicated in replacing conventional cost systems with more complex and innovative accounting techniques (Bromwich and Bhimani, 1989)' but Bhamani and Pigott's research looked at those factors that arose post implementation of ABC. Nonetheless, they state that 'research concerns over such consequences in relation to organisations implementing ABC have remained largely unaddressed' (*ibid*, pp.120)

CIMA has commissioned a number of research projects (see for example Innes and Mitchell, 1991; Cobb *et al*, 1992) into ABC. These were specific longitudinal case studies, however they do give some general indication of how the process was managed from data gathering to implementation and some parallels could be drawn with the University case study.

3.2.1 Innes and Mitchell study 1991 (CIMA)

The 1991 CIMA study focused on the development and implementation of ABC at an engineering plant where in-house staff were used exclusively to develop the model. The need to create a new system stemmed partly from external factors such as the increasing competitiveness of the market, but an important internal factor was that of the inadequacy of the current accounting system to deal with Just In Time and Total Quality Management.

This study is worthy of some attention as there are a number of points that emerge that could be applicable to the University case study.

A group of managers within this organisation were studying for an MBA where the financial controller's dissertation topic was related to ABC. The managers on this course had favourable attitudes towards ABC and managed to persuade the Finance Director and the Board to develop ABC within the organisation.

The study reported that staff were sent to attend ABC conferences to increase their knowledge of this approach and two consultants made short presentations on other firms' approaches to activity based costing.

Innes and Mitchell also stated that from an early stage the 'top management responded quickly and favourably to the idea of becoming actively involved in supporting its [ABC system] development' (*ibid*, pp. 9). The research concluded that whilst there were some problems, although not considered to be significant, in keeping to the original timetable due to operational demands on staff, the activity based costing data were used in a supplemental manner, in the first instance, to the current accounting system. This supplemental manner in which the ABC data were used, it was suggested, may have had an impact on how the operational managers reacted to the new costing system. Interestingly, the operational managers considered that it was the attention directing aspect of the cost drivers that was particularly significant for strategic purposes and that the costing information that the ABC system provided was secondary to that.

The Innes and Mitchell study provided evidence of a structured data collection and implementation plan, which included a preliminary interview stage where managers provided information about the department. This also served as an opportunity to explain the rationale behind considering activity based costing and to obtain, what the authors termed, 'acceptance of its [ABC] value' (*ibid*, pp.12), i.e. managers would accept that this was a worthwhile task and consciously buy into the process. This was an important behavioural stage in the process of change and was also identified by Kaplan (1990) where it was noted that there were problems of educating managers and overcoming resistance to change.

Following the creation of the ABC model a post development interview with managers was conducted. This was semi-structured in nature, lasted for approximately one hour,

included an explanation of what managers understood by ABC to ensure a learning process had taken place and obtained feedback from managers as to their thoughts on the technique. Importantly, this study reported that the ABC model confirmed the perceptions of managers that some operations were more costly than others.

Innes and Mitchell provided a summary (see below) of the factors that they considered influenced the success of ABC in this research project, but they do however, state that a decision was taken not to implement ABC across the whole organisation. Priority was given to areas that were large in financial terms and also areas that managers were enthusiastic towards which helped in a 'successful start'. The issue of enthusiasm is an important behavioural characteristic as without this there may not be so much momentum for change. Whilst this issue is raised now, change management will be discussed later in this chapter.

A summary of the factors that Innes and Mitchell identified; were...

- The process involved consultation and acceptance and thus was carefully tailored to management's needs,
- ABC's purpose of cost control and reduction was clearly established which matched management's strategic policies and goals, leading to strong support throughout the period,
- The accounting team were given encouragement from senior accounting personnel and the Board,
- There was a well structured timetable for development, and
- The data gathering was undertaken in an open and participative manner so that the resultant information used, was beneficial to the firm.

Finally, whilst Innes and Mitchell's study portrays the successful implementation of an ABC system, they caution that 'attempting to produce a comprehensive system from scratch might well have failed' had the 'limited, and variable resources' (*ibid*, pp.30) not been carefully applied to the project. A further cautionary area to be aware of is mentioned by Horngen (1990), where an example is given of an ABC system which failed to be implemented because it was too complicated, however this 'myth' is challenged by Turney (1990).

Staubus (1990) suggested that a factor affecting successful acceptance by managers was the impact of raising product costs (or falling profit margins and increased competition), but this should have been a function of education and realisation by managers that ABC provides a more realistic product cost. Although ABC may produce more realistic product costs, the behavioural factors of managers who are on the receiving end of rising product costs needs to be managed with care.

3.2.2 Cobb, Innes and Mitchell study 1992 (CIMA)

Cobb *et al* (1992) identified a number of specific problems in their research, which they considered had an adverse impact on implementing ABC. In smaller companies these problems had led to a rejection of ABC; larger companies had managed to overcome them. Irrespective of the size of the organisation, these issues are important and so are discussed below.

The main problem Cobb *et al* (1992) identified was that of resources; be it physical or financial. However, this contrasts in part with Turney's (1990) assertion that the cost of

implementation is not as expensive as managers originally think. Nonetheless, Cobb et al[10] suggest that resources, which could include a financial element, are a critical factor.

A further problem that Cobb's research identified was that of 'accurate data collection, especially gathering data on cost drivers' (*ibid*, pp.30). Once again Turney's conclusions are at odds with this comment stating that 'much of the data required by an activity based costing systems already exists, or can be easily captured' (Turney, 1990, pp.25). The fact that the data exists does not necessarily mean that it is in a usable form, or that it is accurate.

Third, Cobb identified a problem of 'coping with the fact that activities cross existing departmental boundaries and areas of responsibility' (*ibid*, pp.30). This was also evident in Innes and Mitchell (1991), and Gietzmann (1991) wrote that there is an important difference between causality and controllability. This highlights the practical problem that exists where one manager causes costs and another has responsibility for controlling them. It would appear that to eliminate such a problem there might need to be a change in the organisational hierarchy so that activities do not cross departmental boundaries and areas of responsibility. Such a course of change would require specific attention and the literature on change management (below) identifies a number of salient points dealing with the complexity of change.

The fourth and fifth major problems that Cobb's research identified centred on the constraints and pressures of work and priorities. Whilst there was generally an enthusiasm for ABC, other issues put pressure on the accountant's time and were given

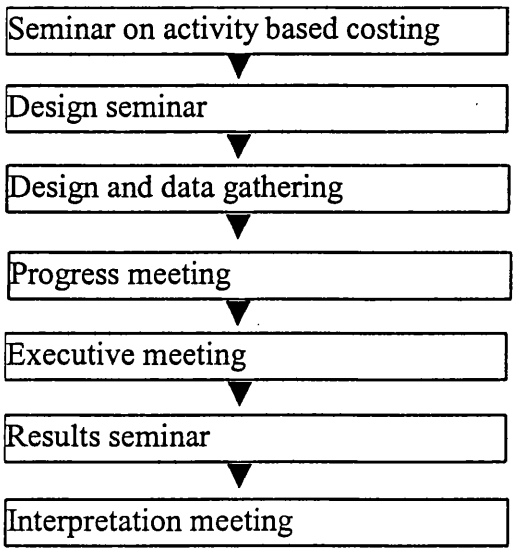
[10] For clarity and to aid the readability of this section the Cobb et al study will be referred to as Cobb.

a higher priority than the costing system. Innes and Mitchell (1991) identified that accountants were formally allocated developmental time and a clearly defined timetable was laid down to avoid any significant deviation from the schedule. The issue of timeliness is clearly an important area that needs to be considered if motivation and commitment is to be maintained through this lengthy process.

3.3.3 Cooper study 1990

Cooper (1990) looked specifically at implementing an activity based costing system and produced a structured implementation plan that comprised seven steps (Figure 3.1). Cooper stated that a complex system was produced initially that could be simplified at a later stage if necessary, however, there are research conclusions to suggest that implementation of costing systems fails (or may fail) because of over complexity (Horngen, 1990; Innes and Mitchell, 1991). What Cooper failed to define was what constituted a complex system, as this would depend on a number of factors, including driver numbers, cost relationships and organisational structure.

Figure 3.1: A structured implementation plan. Cooper (1990)



Therefore, one may argue that complexity is a relative term, and Cooper does not provide any further assistance in determining how complex, 'too complex' is. Cooper does, however, give a warning about complex systems by stating that the risks involved in producing them are that users can be overwhelmed by the details provided by the system and the costs of implementing and maintaining such systems can be excessive.

With this in mind the seven stage process (Figure 3.1) was developed to assist in the implementation of ABC systems. Cooper adds a note of caution that following this structured plan does not guarantee success; however, organisations that have followed the approach have implemented ABC successfully.

3.3.3.1 Overview of the structured implementation plan (Cooper, 1990)

Figure 3.1 provides the structure of the plan and this section will discuss the important points in each.

The opening seminar was used to help educate management as to what ABC entailed and was a forum for engendering a discussion about the technique. The more detailed requirements for starting such an exercise were the content of the design seminar. This second stage (design seminar) provided the group with 'a strong team identity, which proved to be a major factor in the successful implementation of the new system' (*ibid*, pp.37). The educational process of this second stage served to crystallise the concepts and practicalities of what ABC is. The data gathering process consisted primarily of

interviews that created the raw data and from Cooper's summary of the process, the data provided a 'complex[11]' (*ibid*, pp.39) system.

The fourth stage involved disseminating information to the managers on progress to date which allowed time for the managers to review the system and identify any potential errors as well as giving them the opportunity to feel a part of the process and 'develop some ownership of the system's design' (*ibid*, pp.40). This developing 'ownership' was evident in Innes and Mitchell's (1991) research where the managers consciously bought into the whole process and this, it was argued, was an important factor in the successful implementation of the model.

Following the progress meetings, the executive seminar facilitated a more detailed explanation of ABC and prepared management for the first results. Cooper reported that as these results were expected to fluctuate as more appropriate bases were identified for allocating costs, then only a few selected staff were given the results. Such deliberate action was to prevent doubts being raised as to the validity of the model as product costs changed through changes to the cost drivers, until a steady state had been achieved and the final results were agreed.

The objective of the results seminar was to look, in detail, at the system and understand why the costs were different under the new costing method. In the instances where costs were significantly higher, there were follow up meetings arranged with the respective manager to discuss the implications of the revised costs. This was part of the agenda of the interpretation meeting where these managers reviewed the system carefully to

[11] ABC system consisted of 630 distinct activities and between 30 and 40 bases of allocating costs.

ensure that 'no major mistakes had been made' (*ibid*, pp.41) and to decide what to do with the products, e.g. change the production process or withdraw the product.

Finally the interpretation meeting was used to discuss the additional information that the costing system had produced, for example, 'finding ways to change the production process to reduce costs' (*ibid* pp.41). This was a useful aspect of the activity based study as it yielded management information which would equally be as useful as the costing data. Such information enabled managers to understand how costs were incurred thus making it possible for them to try to do something about it. Cooper reported that 'activity based costing confirmed the intuitions of some engineers; that parts...were expensive to manufacture' (*ibid*, pp.41). This was an important verifying statement concerning ABC because if management perceived something to be expensive and this was confirmed through the study then they were more likely to 'buy into' the process and help make implementation more straightforward.

3.3.4 Summary

The review of the above studies into ABC have yielded some interesting insights into what could be termed critical factors that help to enable implementation of new complex costing systems. However, during these discussions the notion of change management was referred to on more than one occasion and this review now considers the relevant aspects of this field.

3.4 Change Management

This section of the literature was reviewed because of the need to understand the driving force behind any change to the status quo and how the behaviour of people would

impact upon that change. A number of authors (Pettigrew, 1973, 1985; Buchanan and Badman, 1999) make reference to the importance of politics as one of the key elements of change. Politics can be referred to as 'those activities taken within organisations to acquire, develop and use power and other resources to obtain one's preferred outcomes in a situation in which there is uncertainty or dissensus about choices' (Pfeffer, 1981, p.7). Pfeffer makes reference to the notion of 'power' and this is further refined by Hardy (1996) into four dimensions:-

- **Power over resources**. This refers to when 'power is exercised by actors to influence decision outcomes and bring about the desired behaviour through the deployment of key resources on which others depend' (pp. S7). This would include the ability to hire and fire, or the control of rewards or funding. This type of power tends to be task orientated and requires the continued deployment of either the carrot or stick.
- **Power over decision-making**. This refers to the explicit move to change the subordinates' participation in the whole change process. It permits the more powerful decision makers to determine the outcomes from behind the scenes by using their power and political advantage.
- **Power over meaning**. This concerns itself with influencing the view held by others about the status quo either to maintain it or to create the perception that change is needed, desired or rationale.
- **Power of the system**. This refers to the notion that the system itself (for example, the current accounting system) has values, traditions, cultures and structures. Thus the system is vested in the status quo and it will need to be challenged if change is to take place. This final power, it is argued, cannot lead to change, however the weight of this final dimension will impact upon the ease

of change and how much power is required of the other three dimensions (above).

There appears to be a general consensus on the basic stages involved in change management (Tomkins, 1991) with numerous authors (see, for example, Peters and Waterman, 1982; Kanter, 1983) commenting on the need for top managers to 'talk up' the new strategy and ensure prominence is given to it at the appropriate interactions within the organisation. However, to implement new structures requires an appetite for change and it is argued that such an appetite will be difficult to instil in managers when there is no impending crisis (Kanter, 1983). Thus, change is easier to make when there is a crisis and it is evident that the current mode of operation will not be sustainable.

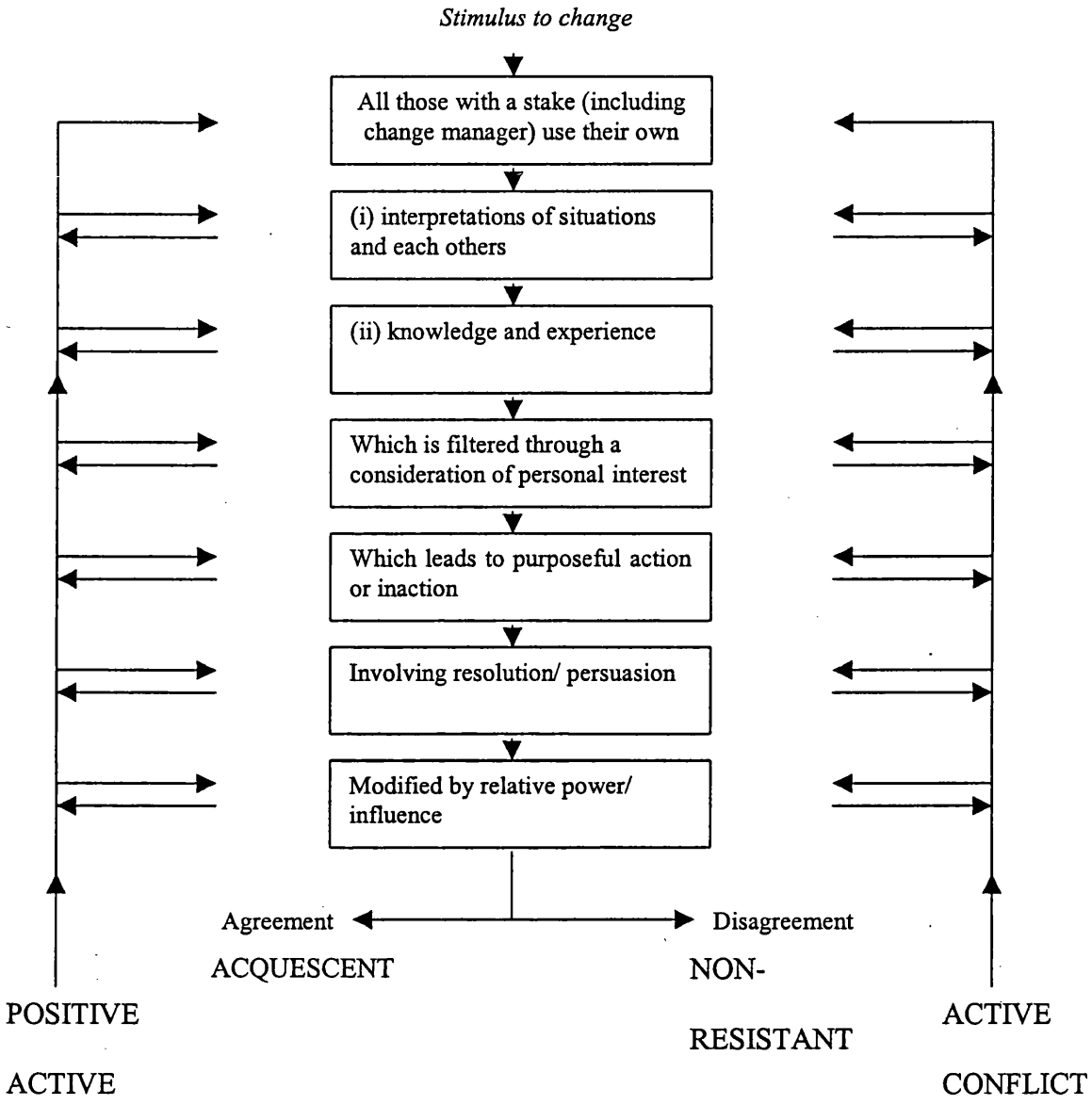
An organisation that wishes to create change proactively rather than react to a crisis is therefore in a much more difficult position to engender change. Under these circumstances those with 'majority power' (i.e. have power in the first three categories as identified by Hardy, 1996) need to be persuaded (by the promoter of change) that they would be better off if change occurred. The personal benefit of change can also be considered alternatively as an obstacle to change; if change occurred resulting in a worse position than that of the status quo then that would lead to resistance.

Such behavioural factors of those in powerful or political positions within an organisation should therefore not be underestimated and this needs to be carefully appreciated. However the knowledge acquisition and training mechanisms that were put in place in the case studies above should not be seen as significant to bring about

change. These mechanisms have a supporting role, but would not bring about change in their own right (Tomkins, 1991).

An attempt to capture the complexity of the issues involved in creating change is shown in Figure 3.2 (Tomkins, 1991). Tomkins suggests that the individuals involved in change will react differently depending on their own perceptions, experiences or aspirations of what change will mean for them. This individualistic approach to change, and the fluid nature in which perceptions etc. are altered by those that have power (over meaning in particular) could, Tomkins argues, result in the whole process of change breaking down if it is not well managed.

Figure 3.2 Change as a social process (Tomkins, 1991, pp.204)



The numerous potential loops that could occur as the change process unfolds demonstrates the complexity that is inherent within it. This, coupled with the issues of power and politics within an organisation, does therefore provide a valuable insight into the issues that one should be aware of when dealing with change management..

3.5 Conclusion

There are a number of important issues that have been raised in this chapter, ranging from the current, if limited, analysis of ABC within the university sector, the case studies of ABC and the problems associated with change management.

The case studies within the literature review have provided valuable insights into how ABC was implemented within organisations and the processes they embarked upon. Some of these factors, as well as change management issues, may be evident in the University case study and the extent to which they are apparent, may provide some explanation as to why ABC was not implemented successfully.

The fundamental research questions that arise are outlined below and these are discussed within Chapter Six, which follows the detail of the case study:-

1. There are a number of ingredients that appear to be evident in successful implementations of ABC systems including:-
    a. The personal acceptance by management that there is value in using activity based costing principles and they feel part of the whole process (Cooper, 1990; Kaplan, 1990; Innes and Mitchell, 1991; Shields, 1995).
    b. An education process should be considered to improve the knowledge of managers that are to use the ABC data so that there are common areas of understanding (Cooper, 1990; Innes and Mitchell, 1991, Cobb *et al*, 1992; Shields, 1995).
    c. There should be a structured plan with time frames (Innes and Mitchell, 1991; Cobb *et al*, 1992) so that consultation can take place in an open

and transparent manner with appropriate debriefing opportunities to discuss matters arising (Cooper, 1990; Innes and Mitchell, 1991).

d. The final results from the study should confer with the general perception (the 'gut feel') of management (Cooper, 1990; Innes and Mitchell, 1991).

These ingredients, are flagged as important issues to consider and discuss following the detail of the University case study in Chapter Five.

2. To what extent does the change management literature help to explain the reasons behind the failed attempt to implement a new costing system?

3. Evidence from the literature would suggest that many universities are embarking on a costing system that allocates overheads to schools rather than considering the costing of courses/ activities. What is the justification for the development of a school costing model given the main benefit of a course costing system is to cost the individual elements within the department rather than a department as a whole and thus aid decision-making? Is there a conflict of objectives between a course costing system and a school costing system, or is there an alternative costing system that may be more appropriate for a university?

The following chapter now considers the research methodology that was employed to analyse the unfolding events within Fernleigh University after it had failed to implement an ABC system so that a robust, valid and reliable account of events can be portrayed in Chapter Five.

CHAPTER FOUR

Research methodology

This chapter provides a detailed view of the research methodology that was employed for the first section of this research, giving justifications where appropriate and providing an explanation of the terms where necessary. The development of a methodology provokes thought into how research should be conducted, giving particular prominence to the paradigm[12] one is working within and therefore ensures that the conclusions that are made are robust, valid and reliable.

The paradigm in which any research is conducted is made up of two elements, namely the ontology[13] and epistemology[14] of the researcher. The combination of these two elements provides the working paradigm in which this research is conducted and is sculptured by definition of what is being researched.

The analysis and understanding of the events that took place within the University required a specific form of methodology to be developed so that a rich and detailed account could be obtained. Therefore a phenomenological viewpoint is identified as a starting point.

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[12] A paradigm is a working model which one fits into depending on the philosophical stance one takes and one's perception of how knowledge is gained.

[13] This is the branch of metaphysics that deals with the existence of being, i.e. what it is that we are. The answer to this question depends upon ones own constructs and categorisability of the world, as it is seen though the eyes of the researcher. By this definition, different people view the world very differently and so they would have different ontological perspectives.

[14] This concerns itself with the theory of knowledge; its validity and the methods employed to gain that knowledge. Again the methods employed to gain knowledge will vary, but a researcher may feel that everything that is gained to produce knowledge must be gained objectively, i.e. the data must be tangible.

A phenomenologist would argue that some knowledge cannot be gained through objective measures and so it is valid to use subjective techniques. It could be argued that subjective techniques will include an element of personal bias and this is to be accepted. It can however, be minimised through being critically subjective[15].

Through the combination of one's ontological and epistemological stance, it is possible to start to identify methodologies that can be employed to undertake the research. For example, if one was a positivist then quantitative techniques could be used to obtain the objective data. If, however, a researcher felt the phenomenological stance was more applicable then the research would probably lend itself towards more qualitative research, but this does not mean that one technique would necessarily exclude the other. The manner in which the data is used is just as important and this section of the research, based on a single University case study, focused on the interpretative paradigm. Thus, irrespective of the collection method of the data, it was possible to generate meaning from it and therefore interpret it rather than subject it to rigid statistic hypotheses.

One way of undertaking research is to form a hypothesis (a belief or notion about a phenomenon) and then undertake research to see if that notion can be falsified. This requires the researcher to formulate a hypothesis and this means that one already has some preconceived idea about what one is researching. At the end of the research, one would draw conclusions from the data, which would either support or not support the original hypothesis. That method is suitable in some circumstances, however this

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[15]Critical subjectivity accepts the premise that being subjective allows bias to form. However, by being aware of this and analysing the subjective comments critically one can reduce this. It may also

research is seeking to understand a phenomenon rather than prove or disprove a hypothesis. This is classified as exploratory research and can be likened, vaguely, to a grounded theory approach, developed by Glaser and Strauss (1967). Using this technique one does not begin with a theory, which is tested, rather one begins with an area of study and what is relevant to that area is allowed to emerge (Strauss and Corbin 1990). One must, however, recognise that only limited conclusions can be drawn from a single case study (Laughlin, 1996).

Glaser and Strauss advocated a system of coding and forming hypotheses from similarities or differences, which is where an exploratory study differs to that of grounded theory. In this research the basic concept of grounded theory was followed, i.e. allowing the rich data to emerge from the case study rather than formally coding the data.

There are a number of methods that are used to collect qualitative data, for example, the ethnographic approach, which concerns itself with the researcher becoming part of the organisation under study. This method enables one to learn about a world by encountering it first hand and making some sense out of it (Agar, 1986). The author of this research was in a fortunate position in this respect by being closely involved in the development of the new costing system and working within the University that had been studied. This, inevitably, gave richer insights into the research than a researcher who did not work within the university sector doing research on universities.

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involve the researcher acting in different capacities to ensure the data passes the test of reliability.

Using this methodology it was possible to explore the process of the University and understand what actually happened. This provided theory that could be substantiated in the reality of the phenomenon that was studied, i.e. it built theory that was representative of the area under study. A drawback to forming hypotheses at the outset is that whilst the research outcome may support the hypothesis, at the end of the research one may have only just supported the hypothesis and the results may not be particularly relevant in practical terms. The exploratory (or grounded theory) approach does, however, enable the research to identify relevant issues as these are created through the intimate engagement of the study under review.

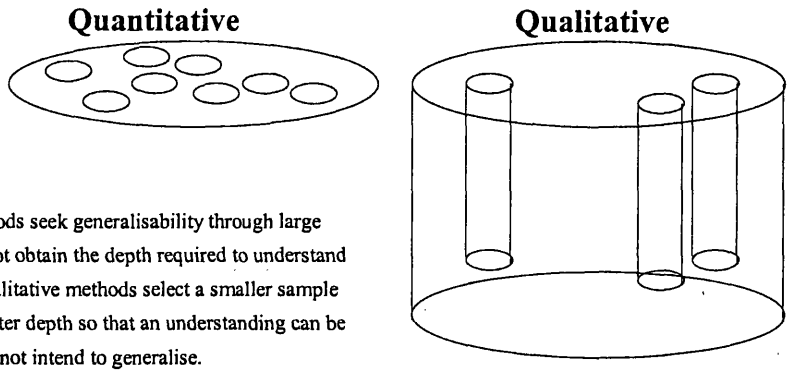
Having identified that a phenomenological view was the preferred epistemological perspective, it was necessary to identify an appropriate methodology that would enable the collection of data and ensure it was valid enough for theory to be developed from it (the ontology).

4.1 The case study research methodology

This section of the research methodology concerns itself with understanding the issues surrounding the failed attempt to implement ABC within the University. The data that was required could only be obtained through primary data collection methods that could probe deeply into the phenomenon and therefore a qualitative research approach was required (Figure 4.1 demonstrates the difference between quantitative and qualitative outcomes).

Figure 4.1: Comparison of quantitative and qualitative methodologies.

Source: Bath University research methodology course; 1995



Quantitative methods seek generalisability through large samples and cannot obtain the depth required to understand a phenomena. Qualitative methods select a smaller sample but obtain far greater depth so that an understanding can be achieved and may not intend to generalise.

These are not mutually exclusive methods but under certain circumstances, one may be preferable to the other.

Qualitative research is a term that encompasses a series of techniques including interviews that range from well structured to unstructured and trying to define what it includes is more difficult than defining what it does not (Silverman 1993).

The technique that was predominantly employed in this research was that of semi-structured interviews, otherwise termed a focused interview. Merton *et al* (1956) explains this technique as one where the researcher is informed and knowledgeable about the focus of the interview, which enables the interviewer to guide, direct and interpret the process to achieve the express purpose of the focused interview. Thus, research attention is targeted at the background and experience of the interviewee so the objectives of the researcher, i.e. eliciting data concerning the phenomenon, are met effectively and efficiently. Tull and Albaum (1973) stress that respondents must be able to formulate the information desired and therefore they must have experiences, intentions, factual knowledge, opinions, attitudes and, above all, memory of the issue in question. Therefore careful consideration must given to the people within the organisation who are to be interviewed.

This is a very important area and one that was considered in detail. The purpose of conducting the literature analysis before undertaking the interviews was to be informed and knowledgeable about the issues. The semi-structured interviews were also carefully considered in their own right as an approach to obtaining the data. The purpose of this data collection approach was to allow the interviewees to do the vast majority of the talking so that as much as possible of the recall of facts was from the memory of that person rather than the prompting of the interviewer. However, the semi-structured approach was flexible enough to permit the exploration of areas where important, unprompted comments were made.

The interview process must account for the following issues to ensure that reliable and robust data is obtained; interviewer bias, obtaining trust and relevance, and consistency of the interview process. These are taken in turn:-

- **Interviewer bias**

Traditionally, in quantitative research, the requirement to avoid bias is regarded as crucial to the validity and reliability of the research being conducted. However, in qualitative research, particularly in the case of interviews, there is a social interaction between two humans that may not be replicated exactly in the future, given that one's views may change over time. This is due to the different personalities of different people, their culture, their life styles and perceptions of the world. Therefore the concept of bias had to be accepted and used, creatively, contingently and self-consciously (Jones, 1985). The interview process would enable the author to empathise with the

interviewee to elicit information in a way, which no other research technique could permit (Diesing, 1972).

- **Obtaining trust and relevance to the interviewees**

This research required access to information that had not been, and probably would not be made, publicly available to anyone outside the University. It was essential therefore that the University was fully aware of the purpose of the research and that there were not any hidden agendas concerning this process. It was critical that all relevant information required was explicitly made clear from the outset so that the chances of completing the interview programme were not jeopardised through any non-disclosure. Obtaining the trust of the interviewee in an interview situation was very important for a number of reasons. The most significant was because the perception the interviewee had of the interviewer might alter the interview process (Harré and Secord, 1972). For example, if the interviewee believed the information would be used against them in the future then they would be defensive and may not provide as rich an account as would be preferred by the interviewer. Also, if the interviewee was a powerful manager and did not consider the research to be relevant or important then they may be unwilling to disclose sensitive information. If time is pressing they may be inclined to give the interviewer short, sharp answers or answers which they think the researcher wants to hear. A host of dysfunctional behavioural issues could arise if there was no trust between the parties, which would lead to difficult decisions having to be made as to whether the interviews could be relied upon.

- **Consistency of the interview process**

The interview process was semi-structured which allowed a number of questions to be asked, but permitted the interviewer time to discuss important issues that arose during the course of the interview. By having a small number of questions, the interview could be brought back on track if it started to move into tangential issues that were not relevant to the area of research. To that end, the interviews were consistent as the questions allowed discussion around the predetermined areas and permitted further exploration where necessary.

The identification of areas to be covered in the interviews came from two sources: the literature and first hand experience. However, before starting the interview process it was necessary to pilot the questions and the format of the interview. This was to ensure the interview would elicit the information that was required in a timely manner. Thus a semi-structured interview with a small number of guidance questions (Appendix 2) was selected that would serve the research objective best.

4.2 Reliability and validity

Before starting the interview process it was also necessary to consider the issues of validity and reliability, especially concerning the inferences that would be drawn from the interviewee's responses. There are two extreme schools of thought here: the positivist and the interactionalist.

Briefly, a positivist sees an interview as a means of obtaining facts that are valid, independent of the researcher or the research setting. Selltiz *et al* (1964) state that interviewers should ask each question precisely as it is worded and in the order

prescribed. No additional information should be given, nor any response from the interviewer provided once the questions have been answered. An interactionalist, on the other hand, sees an interview as an opportunity to discuss an area of mutual interest and so will favour open-ended questions and treat the interview process as a conversation (Burgess, 1980).

The arguments of validity and reliability need careful consideration. The issues of subjectivity and interviewer bias were important, especially when it came to interpreting and making inferences from the data that had been collected. As this research was conducted by the author who was involved in the failed attempt to implement the new costing system, there was inevitably some bias and it would be difficult to persuade a third party otherwise. In an attempt to overcome this, the research had to be critically subjective and triangulate[16] the issues that stemmed from the study. Denzin (1970) stated that multiple sources, such as document analysis, respondent and informant interviewing, direct participation and observation should be used as part of the data collection process so that the data that was collected could be substantiated in other forms. To that end, references were made to various documents within the University such as minutes of meetings, working papers and other relevant documents.

[16] This involves seeking collaboratory evidence to support a statement or statements from a separate source, e.g. documentation or confirmation in a separate interview with a different person. Triangulation concerns itself with looking for supporting evidence about a phenomenon from more than one source. It is derived from navigation where different bearings give the correct position of the object.

4.3 Case Study validity

There may be some concerns about the validity of using case studies in research, especially as regards the reliability of the data. To put this into context it is useful to reflect on the following quote:-

'A thermometer that shows the same reading of 82 degrees each time it is plunged into boiling water gives a reliable measurement. A second thermometer might give readings over a series of measurements that vary from around 100 degrees. The second thermometer would be unreliable but relatively valid, whereas the first would be invalid but perfectly reliable.' (Kirk and Miller, 1986, pp.19)

The quote naturally assumes that 100 degrees is the boiling point of water, whereas with interviews there are not necessarily any objective measures of what is correct. However, it is possible to achieve reliable data collection (through triangulation) and the degree of validity that is acceptable to the researcher depends on one's ontological perspective and can be enhanced through critical subjectivity.

A case study approach is often criticised by researchers who use quantitative techniques, as the data that are collected may be biased and therefore may not reflect reality. It was important to ensure that what was written up from the observations and interviews within this research did represent reality. To ensure this, once the case study was written up it was presented to a senior member of staff to read through. This sought to verify that the issues raised and the story told was, as far as reasonable, reliable and valid.

With regard to the validity of the data, a case study approach has three strands: -

i) **Construct validity** where multiple sources of data are identified and there is a chain of evidence within the University, e.g. documents (formal and informal) and interviews.

ii) **Internal validity** through pattern matching and explanation building. This ensures that different people within the University are giving the same explanations, or if they are different then further research would be required to identify reasons for the differences.

iii) **External validity** by being able to replicate the phenomenon. This third strand may be difficult to apply, as the case study is not seeking to be generalisable, but to understand the specific issues at a University.

Silverman (1993) points out other issues of validity, which are...

i) The impact of the researcher on the setting, the 'Hawthorne' effect (Landsberger, 1958),

ii) The values of the researcher (Weber, 1949), and,

iii) The truth status of the respondents account (Silverman, 1993).

The Hawthorne effect was not an issue in this research as the information was collected after the attempt to implement the new costing system, so the actions of the researcher did not have any bearing on altering the study.

The values that were taken into the interviews by the researcher would have had an impact. However, Reason and Rowan (1981), criticise researchers who are fearful of contaminating the data through their own perceptions and experience. In fact, they

argue, that good research goes back to the subjects with the tentative results, and refines them in light of the subjects' reactions. Thus, it was necessary to reflect on the responses of the interviewees and put the interpretations one had made to them to ensure that they were in fact reasonable and therefore valid. Providing the completed case study to the senior member of staff to verify ensured this.

Finally, turning to the issue of the truth status of the respondent. An interesting quote by Whyte (1980) may shed some light on this matter: -

'In dealing with subjective material, the interview is, of course, not trying to discover the **true attitude or sentiment** of the informant. He[17] should recognise that ambivalence is a fairly common condition of man - that men can and do hold conflicting sentiments at any given time. Furthermore, men hold varying sentiments according to the situations in which they find themselves.' (pp.117)

This view places interviews in context: they are not meant to be a rigid and scientific account of a phenomenon, but an interpretation of such a phenomenon as seen through the eyes of the respondent. By completing a number of interviews with key personnel within the University then it was possible to obtain a general and detailed account of the phenomenon which was not biased by varying accounts given by different people.

Once the interviews had been transcribed, interpreted and given meaning, the author verified the inferences with the interviewee to ensure that what had been elicited from the interviews was valid. Going over the essential points with the interviewee to confirm the understanding was a way of ensuring this. This is otherwise termed

reflection where the response is put back to the interviewee as a way of ensuring that an understanding of the comment has taken place.

4.4 Issues arising out of using a case study as a methodology

This section of the research involved analysing a number of complex organisational and environmental relationships within a University. To acquire an understanding of what had happened required a detailed study of that phenomenon, hence the case study approach. In order to fully grasp what was being studied, it was better to immerse oneself in the data rather than structure one's methodology around the theory at the exclusion of the understanding. This also allowed clarity to form around the complex relationships that existed within the university.

It was necessary to have a clearly defined approach (Figure 4.2) where the problem or phenomenon could be academically conceptualised i.e. put into a framework that could be managed by academic techniques of interpretation and theory building. Once an understanding had taken place, the theory could be developed, e.g. identifying the extent to which specific factors impacted upon the implementation of a new costing system. This theory would then need validating by reflecting on the case study material that had been obtained to ensure that the specific factor(s) were present. From that, conclusions could be drawn and meaning given to the research by explaining it in terms which were understood by those who would actually make use of the findings.

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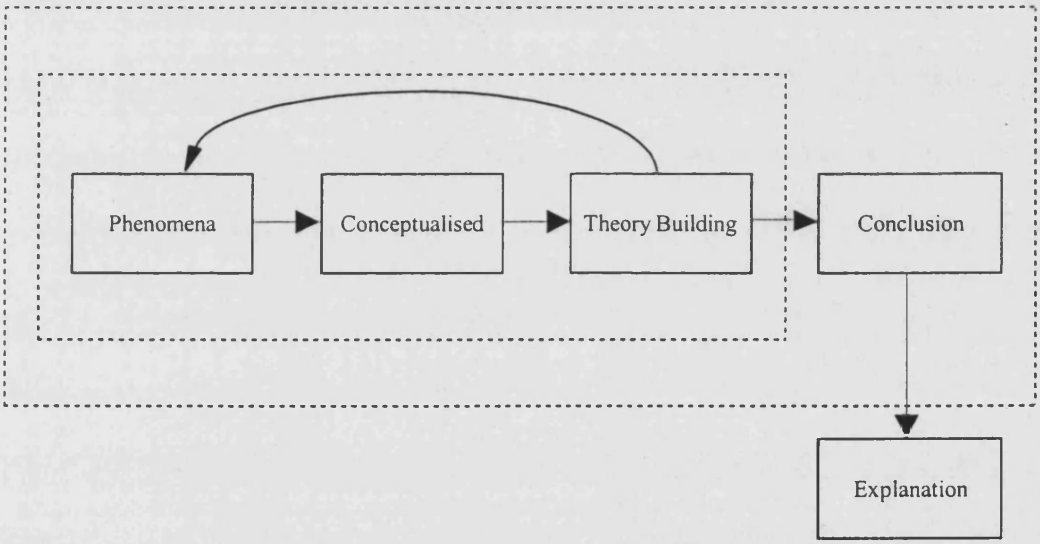
[17] The quote taken is replicated exactly as written and the gender bias was acceptable at the time the original article was written.

A case study approach requires multiple sources of data that need to support one another, in order that the theory, once built, is valid. As qualitative data is open to different interpretations by different researchers, it was vital to realise that this constraint existed and to try to overcome as much subjectivity as possible. For this reason, a single interview could not be used to obtain all the data.

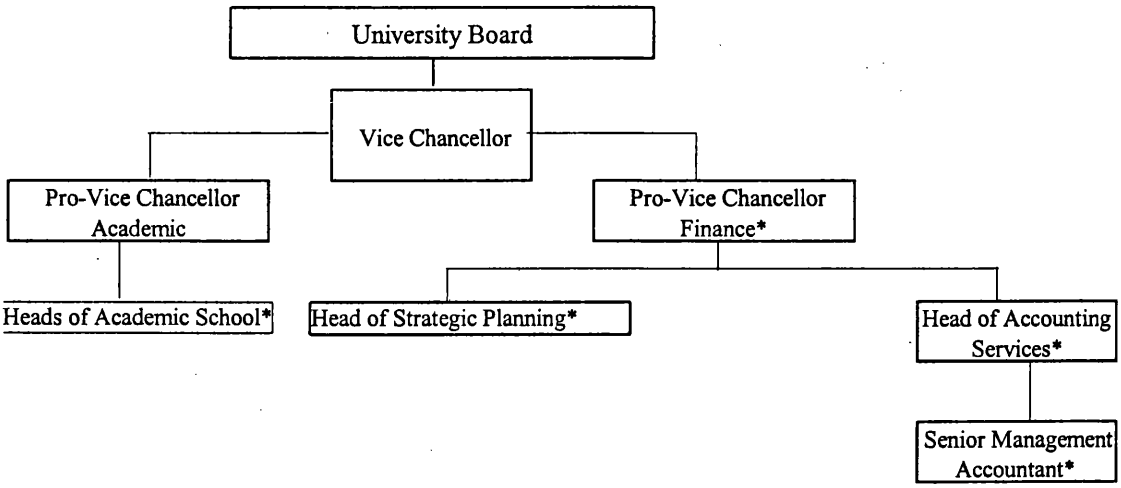
Figure 4.2: Diagram to show process of case study research.

Source: Bath University research methodology course; 1995



The interviews were conducted with key personnel within the University who were able to formulate the information desired and therefore had experiences, intentions, factual knowledge, opinions, attitudes and above all memory of the issue in question (Tull and Albaum, 1973). These personnel had formal responsibility for, or a vested interest in, using the new costing system. This was either in the data preparation stage or in using the final result. The positions of such persons ranged from those within the Chancellory, through Finance Director to the Heads of academic schools. The hierarchy of such personnel that were interviewed is annotated, with an asterisk, in Figure 4.3 for clarity.

Figure 4.3: Extract of hierarchy of the University



Information was obtained from the proponent of change; a senior member of staff from the Office of the Vice Chancellor. That person provided the context of why the exercise was prompted and due to the type of information provided by them, they were considered to be more of an informant rather than a respondent.

Furthermore, it was vital that information was gathered from those who actually undertook the task of compiling the new costing system and also those who would use the data. This was important particularly in light of the comments made by Leornard-Barton (1982) that the chooser of new technology, or technological system, is frequently not the user of it and there could be a degree of conflict arising out of this. Hence the highlighted personnel were identified as key interviewees.

4.5 Analysing qualitative data

The qualitative data was in the form of interview transcripts, copies of internal memoranda, minutes of meetings and other documentation as appropriate. Coupled with this, the actions of the interviewee, their perceptions and other non-verbal data were analysed to gain a full understanding of the attempted implementation of the new costing system.

In analysing this data self reflection[18] was used to help unravel specific issues of conflict between interviewees as occasionally one interviewee may have said one thing but, because of power and politics, meant another.

It was anticipated that the interview process would generate some common themes from the respondents and these themes would have been verified by the literature. However, in some circumstances themes that were not expected may be encountered, and so it was important to remain open minded in this approach. Heisenberg[19] once wrote that where you stand affects your vision; meaning, in this context, that different researchers from a different background may see different themes within the data that was collected. That is why it was important to use self reflection; to avoid being too narrowly focused.

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[18] This technique involved watching oneself analyse the data and consciously try to stop jumping to conclusions which may not necessarily have been there.

[19] Heisenberg, W. Nuclear Physicist. Renowned for the Heisenberg's Uncertainty Principle, which states that if one measures a particle's mass accurately, you cannot measure its velocity accurately at the same instant, and visa versa. This example has been used to support the case of qualitative research were the researcher is being subjective in viewing the phenomena, quoting Heisenberg as there is no such thing as total objectivity. Available at http://www.aip.org/history/heisenberg. Accessed 01/08/2001

4.6 Conclusion

The research methodology that has been put forward demonstrates that the whole process was carefully thought through and therefore would lead to reliable and valid data collection. Geertz, (1973) an anthropologist, argued that a rich interpretation of a phenomenon, as a case study can provide, can back up what has been seen in a way that other research methods fail to do.

Glaser and Strauss (1967) devised the grounded theory methodology and the general principles upon which this was based was a key element of this research; the understanding of the process would emerge from the data rather than being subject to a number of formal hypotheses. Furthermore, Morgan (1983) stated that research is 'a distinctively human process through which researchers make knowledge'. This emphasises the human interaction of the research process that is a characteristic of qualitative research and can be facilitated through a case study approach.

Practically, the research required a structured approach of identifying the themes and patterns from within the University. Through being immersed in the data, and undergoing an iterative process of identifying a theme and verifying its existence, it was possible to build up a tabulated structure of those themes and therefore generate an understanding of the phenomenon.

Finally, the whole process needed reflection to ensure that the conclusions were valid. Through verification, the data can be validated and this in turn can enable the conclusions to be built upon a solid foundation.

The next chapter will now provide the detail of the case study and analyse the attempted implementation of a new costing system using the principles of ABC.

CHAPTER FIVE

The University case study

This chapter provides a rich account of a University's attempt to implement a new costing system. An overview of the historical path it has travelled shows a possibly unique journey that has had a profound behavioural impact on the staff working within it and this could have affected the whole process of implementing a new costing system.

The case study shows, in detail, the reasons why a new costing system was developed, the process that took place to serve that objective and identifies those critical factors that seem to have affected the implementation of the costing system.

5.1 Background to Fernleigh University[20]

During the early 1990s (a further period of rapid expansion in the university sector) this University embarked on a process of launching a number of 'band two' courses whilst also identifying a niche in the market place through the creation of highly original and vocationally relevant courses, sometimes at the expense of traditional 'band one' courses, such as business studies degrees.

This policy meant that a substantial effort was made to recruit small numbers of students to a wide variety of courses. Cohort sizes may have been as low as 30 to 45 students on a new band two course, mainly due to the narrow market it at which it was aimed.

Even after the government imposed a period of consolidation, new courses were being developed in the band two areas as this strategy was still seen as generating superior revenues. Consequently, as the number of students[21] entering the University and receiving awards could not increase, the recruitment targets for some courses were reduced to allow new courses to be developed and therefore recruit students. One particular band one degree, which recruited up to 180 students in the late 1980s, had its recruitment target reduced to 30 over a period of years to allow new courses to be developed. A similar pattern could be seen across a number of band one courses that were being used to 'fund' band two recruitment.

At the time, this strategy seemed to bode well as, viewed simplistically, if it is possible to maintain student numbers at a certain level but switch the income received from band one (lower income per capita) to band two (higher income per capita) then total revenues will increase. In the short term, this strategy seemed attractive, but the longer-term outlook was not so secure as the band two courses were far more expensive to operate. Such strategies were not simply aimed at increasing revenues, but also at repositioning the University in the marketplace.

Some new universities had to create an identity to survive, rather than just being another higher education establishment because the competition for students was intensifying. This was especially the case since the government had capped student numbers. Furthermore, students were realising that a degree was not necessarily a passport to a

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[20] Fernleigh University is a 'new', i.e. post 1992 university.

good job and career. A university had to demonstrate, through various measures, that its degrees possessed added value over similar degrees at other universities in order to differentiate itself.

As the government reduced the income per student each university received from the Local Education Authority, as well as there being a real (in monetary terms) reduction in the block funding, the financial pressures for a number of universities started to build. In this particular University, it could be projected that the additional revenues were not going to offset the decline in sustainability in the short to medium term.

A fundamental oversight in the strategy of switching from band one to band two courses was that band two courses were more expensive to operate in terms of space required and investment in new equipment. Certain direct costs could be identified relatively easily, but the general overheads had not been fully costed in and this had not been duly considered in the decisions that had been made concerning the switching of courses.

Financial projections were demonstrating a worsening financial outlook in the short to medium term and whilst there was a 'gut feeling' within the University that band two courses were more expensive there was little financial data to back it up. The additional problem in universities, unlike manufacturing organisations, was that if a course was not financially sustainable one could not simply stop producing it. A degree course might take up to four years to run its full cycle and so the University was locked in to

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[21] It should be recognised that the restriction on student numbers related to home funded students (that were subject to the MASN). Other students, such as those in the postgraduate and overseas categories were not subject to this degree of restriction.

that programme until all the students graduated[22]. This can be likened to a sea faring oil tanker; one may realise that one is off course but the steering needs to be gradual and it will take time to bring it back on track.

With these pressures facing the University it was decided to set up a working party to identify the full cost of all courses that were being delivered so that better information was available than simply a 'gut feeling'.

The working party, known as the Course Costing Team (CCT), came about through a process that started from the University Board during 1993. The Board wanted to know where costs were being incurred within the organisation as it was becoming much more proactive in managing the University. This was because certain senior staff were uncomfortable with the direction in which the University was going. This was triggered by a number of factors, namely, the University moving out of fee band one courses into fee band two courses because of the, apparently, more attractive income stream associated with band two courses; the changes to funding which were identified in the introductory chapter of this thesis; and internal politics.

The internal politics concerned the then, Vice Chancellor, who had decided that band two courses were to be expanded and some (perceived), very profitable and efficient courses were down-sized though recruitment numbers being redistributed as alluded to earlier. This strategy resulted in a significant one-off reduction of an income stream that could not be recovered due to the restrictions being placed on universities on growth,

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[22] This was the general feeling at this university, although experiences of some higher educational establishments during 2001 would challenge this position. A small number of institutions are considering withdrawing courses before they reach the end of their natural cycle to reduce costs.

expansion and development of new courses. What was not fully appreciated, by some of those in a position of authority, with this strategy was that the fee differential between the two bands was not sufficient to offset the additional operating costs, especially the subsequent depreciation charges on asset acquisitions.

There had been a number of attempts to move the agenda on to costing courses within the University, but as this always had an internal political element, the result was that the pressure never really acquired the priority treatment it required. Yet, there was a feeling by the Board, and some others, that the band two courses must be more expensive as the capital investment in these areas was significant. During late 1993 there was an attempt at costing courses, but this mainly identified the average cost per full time equivalent student and was not widely distributed within the University.

5.2 Culture

As mentioned above, a strategy was employed during the early 1990s that resulted in band two courses being developed at the expense of band one courses. One might reasonably question the validity of this strategy in hindsight, or perhaps query why the issue of medium- to long-term survival was not raised at the time the decisions were being made. The University had a very strong figurehead who had a vision of where the University was going. Indeed, the University, to its credit, developed and expanded very quickly. Such a visionary person in control of the organisation was one who was not to be questioned, as was evidenced on a number of occasions in senior management meetings. In informal conversations, senior management expressed the view that the senior management discussions were more like lectures where one was told what to do and there was a 'real climate of fear' if directed 'requests' were not acted upon.

The management style of the University was very centralist and the views of the Chancellory were the ones on which decisions were made and action plans created. If a new course was to be developed the relevant Head of academic school would be told to create such a course and given recruitment numbers for the next academic year. In the period of the government consolidation of the university sector, the losers of students would simply be told that the target number for their course had been reduced. Consequently, staff were relocated to other schools and courses when these changes were enforced.

Under such working conditions, some staff at senior levels were resentful of such sweeping changes and once it was realised that the strategy of switching into band two courses was going to have a detrimental effect on the University, senior members of the University, in collaboration with the University Board, took radical steps to replace the person who was seen to be central to the impending problems.

Although the Vice Chancellor was replaced, the culture within the University could not change overnight. Whilst the Chancellory did embark on a process of being more open and accessible, which led to more debate within the University on strategy and a recovery plan, there was still an element of caution with regard to senior management's working relationship with the Chancellory.

Following the resignation of the Vice Chancellor in 1994, one aspect of the internal political climate was defused and the CCT was put in place by the Acting Vice Chancellor, to calculate the cost of the courses that the University operated using

absorption costing[23]. The Head of Strategic Planning (HSP), who was to have general responsibility for the project, generated the terms of reference as he had been involved in previous attempts at moving course costing forward and so had some experience of what was required.

Part of the recovery plan was to obtain better financial information through concentrating on calculating the fully absorbed cost of the courses that the University was teaching. Whilst it was appreciated that such information was not wholly suited to decision-making in the short term, it would provide a better understanding of the behaviour of costs than was currently available. To that end, it was decided to make use of the principles of ABC to arrive at a fully absorbed cost.

ABC was identified as the method of arriving at the cost of courses, not through any scientific approach, but more out of the experiences and preferences of the CCT, which had had exposure to the technique through professional studies and had experience of using specialised software which could assist in the task. It was felt that using the principles of ABC would provide a more realistic fully absorbed cost than traditional absorption costing which may only use one or two bases of absorption of overhead costs to courses.

5.3 Terms of reference for Course Costing Team

The CCT was given a project specification which had been compiled by the HSP and the specific terms of reference were:-

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[23] Absorption costing concerns itself with calculating the total cost of a course/ activity. The total costs of which will include a share of the overhead costs of the University.

- To identify and allocate all costs of the University using a full absorption approach to costing.
- To provide detailed course costings, recognising and using, where possible, course specific costs and thereby minimising the use of average costing procedures. NB, The intention is to move away from the departmental costing model generated in the early part of the calendar year 1994 and provide individual course costings.

It concluded by suggesting a pilot study be undertaken in one academic school within the University, which had a relatively straightforward profile, i.e. few courses and little servicing of other courses.

These 'terms of reference' made no specific mention of activity based techniques, yet this was implied. More specifically, the intention was to move away from a departmental[24] costing model where previous calculations had shown whether a department was generating a surplus or otherwise. The main purpose of this new model was to identify where costs were being incurred and to that end it was necessary to identify costs of courses, not just departments.

One of the aims of the model was to justify the perception that some courses were expensive to operate, as prior to this there had been no disaggregation of the University's costs. The annual financial forecasts projected a deteriorating surplus figure

[24] The terms 'department' and 'school' are used synonymously in the context of the case study as the University changed its structure part way through the study as will be explained.

for the University year on year and the University wanted to know where costs were being incurred.

There was a strong feeling by the University Board, and some members of the Chancellory, that the strategy of moving into band two courses had been, to an extent, an inappropriate one and that before any change of strategy could be put into place, the facts and figures should be known. However, a change in strategy, if there was to be one, could not occur overnight as the very nature of a University required a long planning period if courses were to be withdrawn from a portfolio (this was not an explicit objective of the course costing).

Even at such an early stage, however, it was recognised that the academic justification for a course's existence was a vital aspect and simply because it might operate at a loss did not necessarily mean it would be automatically withdrawn. This was recognised at the Chancellory level, yet some academic Heads did not believe the view from that Office because of the historical culture. Evidently there was an element of distrust between the Heads and the Office of the Vice Chancellory. It was, however, noted that if the financial stability of the University was in question as a result of these expensive courses, then the academic argument might succumb to the financial pressures. This would be an extreme measure however, and not one that would be likely if alternative courses of action could be taken.

The CCT recognised that it would not be possible to calculate the true cost of a course, only one that was reasonably accurate. The different ways in which overheads could be absorbed into a course would have a tremendous impact on the final cost that was

calculated. Even using a sophisticated accounting tool such as ABC would not result in a totally accurate course cost because of the difficulties of determining the appropriate cost drivers. Alternatively, the arguments put forward in favour of certain cost drivers might not get the full agreement of everyone so that a compromise would have to be reached. At the end of the day what one would obtain would be a set of cost drivers which most accurately reflected the views of a group of people in a given organisation, but which could be open to debate and change if required. These concerns were taken into full consideration when the Course Costing Model (CCM) was created and through discussions the team identified a reasonable set of cost drivers (Appendix 3 shows a diagrammatic overview of the CCM).

5.4 Start of devolution

One needs to appreciate that at the same time as the CCM was being developed under the direction of the Chancellory, the academic Heads were being given financial information about their schools in an attempt to start a devolution process relating to budgeting and decision making, rather than all decisions being made centrally. This was a reaction to the change of Vice Chancellor and one that was broadly welcomed by the academic Heads. Furthermore, in order that devolution progressed at an appropriate pace, a working party was set up to aid the process and provide a forum for any issues that were to arise.

The devolutionary process was started by the Acting Vice Chancellor to inject fresh debate into the strategic decision making of the University. Following the sustained period of centralised decision-making, and the obvious discomfort of this in certain senior areas of the University, devolution of authority commenced. This was undertaken

to involve senior staff in the strategy formulation of the University, which would have included resources.

The whole process of devolution lacked consistency, particularly in the type of information that was being devolved. At one extreme, sensitive financial data was available and academic Heads were expected to understand how to use it in compiling future budget forecasts with little or no formal financial training. Furthermore, problems within the Schools were identified when it became evident that a substantial number of them did not have a support team with sufficient accounting knowledge or experience to be able to articulate the financial data they were being given to create forecast budgets and business plans[25]. Consequently, a number of staff were relocated/ repositioned so that a greater level of financial/ business knowledge was available within the schools.

At the other extreme, the course costing information was kept very confidential and whilst all the academic Heads were aware that it was being undertaken, none of them knew exactly what the information was going to be used for and this led to some friction between them and the Chancellory. It was quite feasible that some Heads felt very vulnerable whilst the course costing data was being collected, especially as they all knew that the University was facing some uncomfortable financial pressure.

What was not expressed to the academic Heads was whether or not this information was going to be used to change the portfolio of courses and quite naturally there would be resistance to such action from those Heads who would experience negative change. As this was not made explicit there were, at times, heated debates at senior management

meetings between the academic Heads and the Chancellory about what the course costing information was to be used for and when this would be available. Such anxiety grew due to delays by the CCT in producing a final version of the CCM.

The start of devolution within the University was seen initially, by most, as a welcome change. The full ramifications of what this actually meant were, however, to materialise over time. For example, previously the academic Heads had been concerned with running their departments under strict direction from the Chancellory. Now, they were being given greater autonomy to make decisions, but, amongst other things, that meant they had to create business plans and use financial information. Many academic Heads were in their place because of their academic prowess, not necessarily because of their business acumen, and this requirement to deal with financial data was a problem for some of them, and thus for the University as a whole. There was evidence of a severe lack of accounting knowledge, with some academic Heads not understanding a concept such as depreciation, let alone anything more complex (such as ABC).

The move towards decentralisation did not have an immediate impact on the development of the CCM, but it did have an important part to play in its eventual demise. To put this into context; the University had suddenly started to move the power base of decision making away from the Chancellory and towards the academic Heads. Yet the requirement to produce a CCM was being driven by the Acting Vice Chancellor, with pressure from the Board and this was without any input from the Heads who, ultimately, would have to make decisions on the outputs. This power base

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[25] Such problems of 'inexperience of universities and their staffs in operating under such systems' was also reported by Tomkins and Mawditt (1994, pp.33)

shift was gradual and the behavioural impact this had on the whole process was significant.

5.5 Course Costing process

The CCM took six months to create, but more importantly there was a delay before it was presented to the Heads of a further nine months due to re-organisational and other strategic issues that were given a higher priority at the time. In effect, from inception until the presentation of the data to all academic Heads, a period of at least fifteen months had elapsed during which time devolution had picked up a lot of momentum. The balance of power, within the University, had shifted along the continuum towards the academic Heads as they became more involved in the operations of their schools and the University generally.

At this juncture it would be beneficial to give an overview of the main stages of the development and key meetings that took place during the lifetime of the CCM so that time frames and processes can be discussed in context. To that end, Figure 5.1 is a schematic of the key events that developed.

Figure 5.1: Flow chart of key events in the development of the Course Costing Model

	Course Costing Model Process	Other Relevant Events
16th March 1994		Vice Chancellor resigns
23rd March 1994		Acting Vice Chancellor started devolution process. Working Party set up.
April 1994		Working party produces draft report including financial deregulation.
October 1994	Course Costing Team asked to produce model	
December 1994		New Vice Chancellor in place
February 1995	Initial figures produced from Model	
March - April 1995	Individual discussions with Head's of Departments to get views on the validity of the model which only showed costs of the courses - no income and therefore no surplus / deficit.	
1st September 1995		University structure changed from ten Departments to seven Schools
October 1995	Meeting of Heads of School where all School's costs were shown including income streams so that surplus / deficit could be seen.	
4th December 1995	Main presentation of model by Head of Strategic Planning to Head's of Schools concerning Course Costing Model.	

During the six months of the development of the model (which incidentally, was completed in addition to the CCT's existing duties), a considerable amount of raw data was required to use as the basis for the cost driver information. This necessitated numerous e-mails and telephone calls to the respective departmental administrators for information on course content and structure, as the centrally-held database was found to be unreliable following a comparison of the actual profile of a course portfolio within one school and the database. Thus requests were being made to the academic departments for data with very short lead times in which replies were required.

Once the initial results had been obtained from the CCM, a small team was taken though the logic of the model to ensure that it was technically accurate and the assumptions made were reasonable. The small team comprised the Head of Accounting Services, Head of Strategic Planning and the Acting Vice Chancellor.

The output of the CCM was purely a cost of each year of a course and at this stage no revenues had been allocated. However, it was possible to calculate a cost per student and perform some basic calculations to see if the course was likely to generate a surplus or deficit based on very simple average revenue figures per student in band one or band two courses. These revenue figures were generally well known within the University, although the accuracy of them was questionable as detailed calculations had not be performed before.

Prior to the final version of the CCM being published each academic Head was visited by one or two members of the CCT, with details of the costs of each course within their school, (and only their school) and how the cost was calculated. This was so that the

CCT could explain the inter-relationships between costs and courses, the merits of activity based costing, and the reasons why certain cost drivers were selected. The purpose of these meetings was to obtain the general agreement that, in principle, the assumptions, which had been made by the CCT were reasonable and the Heads could follow the logic that had been applied, especially the justification for the cost drivers. If these meetings identified any inaccuracies or amendments then these were subsequently dealt with.

It must be emphasised here that this was the first time any such financial information had ever been disseminated to the Heads.

At this stage the CCT did not want to get into discussions concerning the financial viability of the courses and so deliberately left the income streams out of the presented figures. It was hoped that these meetings would agree the general validity of the model based on the cost information that it provided.

Each meeting lasted for approximately an hour, during which the logic of the model and how the costs of the courses had been calculated was explained. Overall, the comments from the Heads were favourable and those who were interviewed (see Figure 4.3) expressed that they felt they understood the model, even if they were not accountants.

This was an important stage of the model, establishing that it was understandable, and that those who had not had any input into the development of it could follow through the logic that had been applied. It was also the start of the 'buying in' process, which it was hoped would be a key aspect to its success. That is, if the Heads agreed with the

model and were able to work with it by taking ownership of it, then it could become a self-perpetuating feature of their working routine (Innes and Mitchell, 1991). This was an early indication that the model could have become an intrinsic part of financial devolution.

5.7 Course Costing presentation

There then followed a period of six months before the CCM was raised again in a senior management meeting (October 1995), but the impact of this later meeting was a turning point for the CCM.

The CCM was tabled together with the revenue streams associated with each course that took into account the fee income depending on the band and the block funding from the HEFCE. This would have been the first time in the history of the University that any information had been shared collectively concerning the full costs of other Schools' courses and whether courses were generating surpluses or not.

It is important to reiterate that, individually, the academic Heads were reasonably content with the cost drivers, the assumptions behind the model and they confirmed that they generally understood it. This subsequent meeting was quite the reverse of what one would have expected given these individual meetings. The only difference at this stage was that the model showed income as well as costs and Heads could now see the performance of other departments. The findings of the model did not substantiate the views of the Heads (for example, some departments were perceived to be 'cash cows' which were not verified by the model) and, to quote one interviewee, 'the results seemed bizarre ... which gave rise to the initial questioning of the model'.

The perception was that some departments were expensive to run as they had had significant capital expenditure over recent years, which was a requirement of some band two courses. Furthermore, the fact that some departments were also considered to have been cash cows, yet the CCM did not show them to be such, raised serious doubts about the CCM's validity. In truth the model showed that very few courses were generating significant surpluses and very few were showing a large deficit. The vast majority of the courses were broadly break-even.

There was not an immediate reaction against the model, however some views did emerge through the interview process. Most important was the feeling of alienation. As the CCT had been developing the model, and the Heads had had no involvement in it, the Heads then felt somewhat divorced from the whole process and found it difficult to identify why courses were generating the surplus/ deficit that they were. This difficulty in following through the cost relationships in the model resulted in it being termed a 'black box'.

One possible reason for there being little reaction to the model at that time of the meeting was given by an interviewee who stated that 'no one wants to admit in a meeting that one does not know what is being talked about so there is a tendency to go with the flow'. A different explanation seemed to suggest that all the Heads were so surprised at the results that there could not have been an immediate reaction; in effect they were 'shell shocked'.

Whatever the initial thoughts of the individual Heads, as so many months had passed, a subsequent meeting was arranged (December 4th) to formally present the model and this was to be last time it was referred to in its original form.

5.8 Other relevant events

A number of issues need to be explained and clarified prior to analysing the December 4th meeting, particularly the historical political undertones of the relationships between various parties, the change of organisational structure and the reasons behind the expectations of this meeting. Figure 5.1, as shown earlier, shows the order of these events and those that were running parallel to each other.

5.8.1 Organisational restructuring

The formal presentation of the CCM took place on December 4th 1995 following an earlier meeting in October. The CCM was finalised in the early part of 1995 when the University was comprised of ten academic departments. However, by the time this meeting took place the structure had been altered to seven academic schools following substantial reorganisation during the summer months.

This reorganisation alone meant that the information contained in the model was no longer valid, as certain costs had been eliminated, some cost pools no longer existed and some courses were now located in different schools following the restructuring. It was felt that due to the length of time involved in recalculating the costs for the new structure, it would be better to use the outdated model for demonstration purposes. Even so, an interviewee commented that it was extremely difficult to relate the figures to the new organisational structure.

5.8.2 Devolution working party

As can be seen from Figure 5.1, a devolution working party was set up in April 1994 to identify the benefits of devolution and put together guidelines for its implementation. This working party was chaired by the Head of a business related department (AHB) and the other members included two other academic Heads and the Head of Accounting Services. Interestingly, at the same time as the CCM was being developed, this working party sought to develop a framework for financial devolution within the University. This was of particular significance especially during the lifetime of the CCM, as the members of the devolution working party were proactive in the development of a simplified model for allocating overhead costs to schools.

The development of such a model was not expected to conflict with the CCM as the objectives were very different. The CCM's objectives were to identify the costs of courses and to confirm or refute the perception that band two courses were more expensive than their band one counterparts and the additional fee income was not adequate to compensate for this. A school overhead model was being produced so that academic Heads could identify the amount of University overhead their school was being allocated and on what basis. This data was available from the CCM although it was less transparent. The school-costing model was therefore an aid to the Heads to help them identify the magnitude of action that was needed to generate more financial contribution within their school.

5.8.3 Historical culture

There are inevitably internal politics to consider in any organisation, however the historical culture of this University ensured that the internal political scene played an important part in the CCM development and eventual demise.

There were some managers who, through the way they operated, preferred to be given a clear direction from the centre and there were others who relished the opportunity that devolution brought. There was some scepticism however, that the whole process of devolution was genuine and the reminder of the past was still all too evident.

The deceleration of devolution had an impact on the perceptions of what the CCM was ultimately going to be used for. Whilst some Heads did not question what it was for, others speculated about the reasons. 'Speculation' was the correct term to be used, as there was no evidence to suggest that any formal questions were raised at any senior meetings for clarification. The University Board's requirement was to calculate how much courses were costing to confirm their feeling that band two courses were causing the deterioration in the profitability of the University at the expense of more efficient band one courses. However, some Heads perceived this as a forerunner to the withdrawal of their courses and therefore would resist such change.

5.8.4 Distrust

Even though the academic Heads were given assurances to the contrary, there was a real feeling of nervousness by some that if the model confirmed the view of the University Board then courses, or even departments, would be withdrawn. There was a tremendous reluctance to believe the assurances that were being given that the CCM was not a

forerunner to mass withdrawal of courses. In fact, the CCM was never intended to provide that detail of information[26].

The senior person who was giving these assurances was not in a position to determine the destiny of the University (no one person was) and quite frankly did not convince the academic Heads that the CCM was not a forerunner to course removal. There was still a strong element of 'them and us' dating back to the pre-devolution era with the 'them' being the Chancellory and the 'us' being the academic Heads.

This issue of distrust was interwoven with the fact that the CCM had been instigated from Chancellory and there had been no input from the eventual users of the model. These factors and the perceived complexity of the CCM all played a significant part in its eventual downfall, but the nail in the coffin came about from the December 4th meeting.

5.9 December 4th meeting

This meeting followed a briefer earlier meeting in October where the model had put a number of questions into the minds of the Heads concerning its validity, particularly as the CCM did not confirm everyone's expectations about which courses were expensive or efficient. This meeting was an important event for all concerned and all interviewees recalled this event with surprising clarity.

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[26] Using the technique of activity based costing one may assume that if a certain activity is eliminated then the associated costs will also be eliminated. However in a university there are many dual costs, which prevent such a simplistic view being held. For example, if a band two course proved to be making a deficit using full absorption costing then the removal of that course would eliminate the marginal costs of its delivery, i.e. part-time teaching hours, photocopying and possibly staff costs who were solely teaching on that course, but the extent to which other costs would be avoided is not so clear. Many of the overheads that caused that course to show an accounting loss would have to be absorbed by the other courses within the university. Thus, the bottom line

The agenda that the Centre had envisaged was to move on to the next stage of implementing the CCM into a management accounting information system. However, there was a significant expectation gap between what the academic Heads wanted the meeting to address and what the Chair (HSP) of the meeting intended.

The CCM was described as a 'black box' on a number of occasions and the perception of the interviewees was that this meeting was going to 'lift the lid' so that they could understand how the costs had been calculated. However, general agreement now exists with the academic Heads that it was a naive thought to even consider that it would have been possible to educate them all, to such a level as to fully understand the CCM in that meeting.

Furthermore, it was expected that all the CCT members would have been present to field questions concerning the model and that it would have been a time for discussion and debate. This was considered vital as the previous meeting had put a number of questions in the minds of the academic Heads and this, it was felt, should have been a time to alleviate concerns. The meeting was actually described as 'a presentation by the HSP', which to a certain extent was 'uninterruptable'. This was considered unfortunate, as the context of many questions that had been formulated during the 'presentation' had been lost by the time this had concluded and it was felt that a lot of credibility of the model had also been lost as a result of this approach. A further view was expressed that the minds of many had already been made up, and that was that the CCM could not work irrespective of the content of the presentation.

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would be that if the course was producing a positive contribution then the end result, for the university, would be a worsening profitability figure not an improving one if that course was removed.

The Heads were not prepared to have such an accounting system imposed upon them. Whether there were issues of doubt, or perceptions that were not borne out by the CCM, the meeting was not conducive to engaging in discussion. One academic Head (the AHB), who had accounting experience was intent on wanting to understand the reasons why the model seemed to defy logic in that one course which was widely perceived to be expensive was shown to be profit making in the CCM. This issue cast some doubt in the minds of the other Heads that the model was reliable and valid and the CCT were not present to provide the reasons. A 'superficial explanation' was given by the HSP, which was not satisfactory and therefore added to the doubt in the minds of the Heads.

This requirement for open debate was in marked contrast to the way in which the University would have implemented new strategy in the past. However, the style of the presentation was not conducive to open debate as many points were covered without the opportunity for questions and there was general discomfort about the CCM.

Once doubt had been expressed in an open manner it would have been difficult, but not impossible, to restore confidence in the CCM. However, rather than embarking on a restoration plan, the meeting concluded that the AHB would produce a revised model. Effectively that was the last time the CCM was referred to and a revised model was produced using absorption costing and identifying two bases of allocating overhead costs to the schools (student full time equivalent numbers and a percentage of income). There had been a significant shift in power in favour of the AHB and this emphasised the general movement of decision-making powers that had taken place within the University over a relatively short period of time.

Some fifteen months earlier (prior to the devolution process) there probably would not have been any open debate against the model in such a meeting and it would have been implemented, possibly reluctantly. In retrospect if this had happened the University would have suffered as a result of this due to the lack of financial awareness by the majority of the academic Heads.

It was suggested by more than one interviewee that perhaps there was some informal pressure or collusion between interested parties to discredit the CCM in the eyes of others, although there was no evidence to support this allegation. Such discredit would not necessarily be targeted at the developers of the CCM, but rather at the overall strategic direction of the University, i.e. some senior staff had the foresight to realise that such a complex model could not serve the needs of the University for the short- to medium-term and its complexity made it unworkable. Alternatively, perhaps it was because certain courses were shown to be non-profit making and some senior staff were resistant to change as it was not in their best interests.

5.10 Conclusion

Originally, the CCM's objective was to cost the courses that were provided by the University. This objective was clearly understood by the developers and that is exactly what the model achieved. However, due to the time frame involved and the momentum of devolution, what was actually required by December 1995 was something quite different. The model had shown some interesting facts about the University's costs that are quite correctly kept confidential and not necessary for this thesis. However, what was required by the end of 1995 was a model that could be used in a proactive way to help manage the University though a difficult financial period. The CCM provided an

accurate historical snapshot of the University at a given point in time, but was not capable of performing straightforward what-if scenarios. It required a major redesign to fit in with the new school structure of the University and the University management now preferred a simple model that would enable the Centre to exercise a reasonable level of financial control, yet provide non-financial managers with the tools to manage their school in the routine annual financial cycle.

In summary, there are a number of factors that can be identified from the preceding paragraphs that all played a part in the eventual demise of the CCM. Some of these factors are very specific to the historical background of this University; the devolution process, the manner in which the whole episode was managed and the fact that the requirements changed over the time period and the CCM did not change with these.

The CCM met its objective, which was to cost the courses using an appropriate absorption technique. However the 'solution' provided was perceived as too complex and the naivety of the University in assuming that non-financial managers would understand it proved to be a major factor in its downfall.

The University finally embarked on a very simple model that used two absorption bases for allocating overheads to the academic school level, rather than to courses. This, in turn, enabled the respective manager to identify whether or not the school was making a financial contribution before central overheads were allocated. This also highlighted how much overhead was being allocated (with a reasonable level of simplicity), and which served the needs of the non-financial managers.

It was realised that the school-costing model, through its simplicity also had its limitations, but through a slow education process it was intended to make the model more complex over time (and importantly) this was with the agreement of all the academic Heads.

The question that strikes at the very heart of this section of the research concerns itself with why universities prefer to cost schools rather than courses. Mitchell's (1996) evidence was of the majority of universities allocating overheads to the school level and this, after a fashion, is what happened in this University. If a university were a manufacturing organisation it would analyse the costs to the product level. Yet the evidence from this case study and other research findings (Mitchell, 1996) falls short of this analogy.

The following chapter will analyse the case study by drawing links with the literature and address the lessons that can be learnt from this. There are a number of interesting issues that arise from this cases study and the balance of this section of the thesis will clarify these and discuss any wider implications.

CHAPTER SIX

Consideration of the Issues raised from the University Case Study

The review of the literature in Chapter Three identified a number of important factors worthy of consideration when dealing with the implementation of new costing systems and the problems that could be encountered thereby. These issues were evident within the University case study, introduced in Chapter Five. This chapter will now draw out those points that were common to both the literature and the case study, to provide an explanation of why the course-costing model (CCM) was not implemented. Furthermore, a discussion will take place to reason why the CCM was replaced by a school-costing model when it seemed evident that these two models had different objectives and this will lead to a discussion as regards the possible elements of costing systems for universities.

The concluding section of Chapter Three identified a series of research questions and these will now be considered in order to identify whether the reality of the case study (the phenomenon) was in or out of line with the issues that were raised therein.

6.1 Research question one

Given the ingredients that appear to be evident in successful implementations of costing systems, what is the evidence from the case study and how does this match with the issues that were raised?

6.1.1 Ingredient 1:

The personal acceptance by management that there is value in using activity based costing principles and they feel part of the whole process (Cooper, 1990; Kaplan, 1990; Innes and Mitchell, 1991; Shields, 1995).

The University case study provided no evidence that the Heads of schools were part of the process. In fact, management was kept in the dark about what the information was to be used for and when it was forthcoming. The whole process was instigated from central management without consultation and there was never the opportunity to 'buy into' the process before it commenced in earnest. This contrasts with the Innes and Mitchell (1991) study, where a group of managers, including the financial controller, were studying for a higher degree, which included a dissertation topic on ABC. Thus the commitment of the finance director and the Board was gained and the operational management had already bought into the process. Thus management felt part of the process, as they had instigated the issue rather than having it forced upon them. Furthermore, Shields (1995) suggested that these issues (behavioural and organisational variables) were the more important variables that helped to explain successful ABC implementation.

6.1.2 Ingredient 2:

An education process should be considered to improve the knowledge of management who are to use the ABC data so that there are common areas of understanding (Cooper, 1990; Innes and Mitchell, 1991, Cobb *et al*, 1992; Shields, 1995).

In the University case study, it was clear that many Heads saw the CCM as very complex (see diagrammatic view of the CCM in Appendix 3) and interviewees

considered the model to be a 'black box'. However, the literature (Cooper, 1990; Innes and Mitchell, 1991, Cobb *et al*, 1992) would indicate that this could have been overcome through an education process if the CCM was not too complex. However, if the model was too complex to understand, then Horngen (1990) suggests that implementation is more likely to fail. There was very little in the way of an education process for management and certainly there was nothing formally provided, which is in contrast to Shields (1995) recommendation. Heads of schools were visited individually by the course costing team (CCT) to gain their acceptance of the cost drivers and agree the logic. However, upon closer scrutiny, there was a huge 'knowledge gap'. Academic Heads, it was suggested, were appointed for their academic acumen rather than financial comprehension and this was evident through the interview process where some Heads of school were found, for example, to lack the understanding of the concept of depreciation. Depreciation was considered a transfer of money to a cash pool so that when it reached a certain value the money could be spent on new items; a serious misunderstanding of a fundamental accounting concept. This lack of knowledge of the fundamentals of accounting was not given the attention it deserved by the University and the attempt to explain the complexities of the CCM informally and on a one to one basis was wholly inadequate. Furthermore, Shields (1995) identified that 'nonaccounting ownership' (pp.163) was highly significant in the successful implementation of ABC. This was lacking in Fernleigh University.

On more than one occasion interviewees suggested that it would have been false optimism to think that one could educate all the managers in the way of ABC to such an extent that they could fully understand the CCM. The education process, it was reported, would have taken too long given the other duties of academic Heads and

probably would never have been successful. This is probably true given the education process started near the end of the CCM development, but it is suggested that the whole process could have been started much earlier if there had been more transparency about the CCM from the outset.

6.1.3 Ingredient 3:

There should be a structured plan with time frames (Innes and Mitchell, 1991; Cobb *et al*, 1992) so that consultation can take place in an open and transparent manner with appropriate debriefing opportunities to discuss matters arising (Cooper, 1990; Innes and Mitchell, 1991).

There was some evidence of a timetable of events that the CCT were working towards, but this was not strictly adhered and delays were experienced, especially during the time of initial completion (February 1995) to final presentation (December 1995). During this period the University's organisational structure changed and the issue of timeliness was compounded by the lack of relevance (as the CCM was based on the old structure). However (and more importantly), the structure of the CCM did not appear to be general knowledge amongst the academic Heads and therefore it was confusing to see the CCM presented on the former organisational structure when it was expected by many to relate to the current situation.

Furthermore, there was not a formal structured implementation plan and there appeared to be an expectation, by central management, that the CCM would simply be accepted. This transpired to be false optimism. The consultation process was one that was conducted primarily by emails in an attempt to obtain cost driver information, but this information was being provided by the administrators of the academic schools with

little evidence that the academic Heads were involved (or interested) in this level of detail. The tone of the email correspondence was forceful in order to obtain the data at very short notices, but which was not conducive to consultation taking place in 'an open and transparent manner'. Furthermore, there is evidence from the University case study that obtaining relevant and reliable data was a time-consuming activity due to the centrally held database being unreliable. Whilst this in itself would not lead to a failure to implement the system, it is at odds with Turney's (1990) ascertion that the data already exists, or is easy to capture.

Finally, the opportunity for a debriefing session was bypassed, as the meeting in December 1995 was described as a 'presentation' and for the most part 'uninterruptible'. This was not a forum for discussion and debate. The manner in which this meeting was conducted resulted in a loss of perceived credibility by the academic Heads and divorced them more so from the process than they already had been (see ingredient 1 above)

6.1.4 Ingredient 4:

The final results from the study should confer with the general perception (the 'gut feel') of management (Cooper, 1990; Innes and Mitchell, 1991).

This is a critical factor and one that simply did not materialise. It is linked inextricably with the education process and understanding of how the CCM operated. If the results were not as expected then the reasons why should have been explained. This would have enabled managers to identify why their 'gut feelings' did not materialise. In the University case study however, the opportunity for explanation (in the December 1995 meeting) was, according to interviewees, 'superficial', 'unsatisfactory' and 'mistimed'.

Interviewees commented that it would have been impossible to educate managers to the level required in that meeting and in hindsight the education process should have commenced long before that, in an open and constructive manner. The lack of clarity and explanation of the CCM resulted in one interviewee terming the results 'bizarre'.

6.1.5 Summary

The ingredients that should have been present to aid a successful implementation of the new costing system were distinctly absent from the University. The apparent disregard of these would certainly have made the implementation of any new accounting system more difficult than it otherwise would have been, but the absence of these was not the whole reason for the failed implementation of the CCM. There were other changes taking place and the iron grip that the central University management had had over the academic managers was loosening at a pace that perhaps took central management by surprise. These changes will now be considered in light of the literature to respond to the second research question.

6.2 Research question two

To what extent does the change management literature help to explain the reasons behind the failed attempt to implement a new costing system?

Hardy's (1996) four power dimensions were clearly weighted heavily in favour of the central management of the University prior to the impending financial crisis that was forecast as a result of pursuing the current strategy of expanding band two courses. This looming crisis became the catalyst for change within the University with, *inter alia*, the Vice Chancellor being replaced, the move by the new Acting Vice Chancellor (with

support from the Board) to create the CCT and the start of a devolution process within the University.

The change management literature suggests that any new strategy (e.g. development of a new costing methodology) should be 'talked-up' and given prominence within the organisation (Peters and Waterman, 1982; Kanter, 1983), yet there was little documentary evidence that the CCM was discussed in detail at senior management meetings within the University.

Even prior to the development of the CCM, there was evidence that the devolution process (including financial devolution) had gathered some pace and a separate working party had been set up to consider the financial deregulation within the University. This working party was still in existence throughout the CCM development and it would appear that the academic Head of a business related school (AHB), who chaired that working party, had developed power (over meaning) during the financial deregulation process. AHB was one of only a few that were in a position to understand the accounting data and, as such, many of the other academic Heads looked to that person for direction.

The fact that the CCM results were termed 'bizarre' by an academic manager and did not conform to the general perception of which courses were profitable, led to many Heads being faced with change that would have shown their portfolio of courses being much less profitable than they had anticipated. The change of costing approach had demonstrated that many courses were broadly at breakeven rather than confirming the suspicions of these Heads that some courses were unprofitable. Certainly some courses

were more expensive to operate, however there were higher income streams for such courses, which brought them broadly into breakeven.

The change in accounting method did not confirm the expectation that some schools were cash cows for the University (AHB was the academic Head of such a perceived cash cow school) and such factors facilitated the resistance to the implementation of the CCM. The existence of such resistance is evident in the ABC literature where Straubus (1990) suggested that a factor affecting successful acceptance by managers was the impact of raising product costs. Given the absence of formal education/ training programme on ABC within Fernleigh University, it is not surprising that academic Heads were uncomfortable with the results and therefore did not realise that ABC provided a more realistic cost rather than a greater one.

AHB held a powerful position within the group of academic Heads and this individual, for reasons of self-interest or wider comradeship, was instrumental in the demise of the CCM. The majority of the academic managers were not in a strong position, as they could not understand the complexities of the CCM. Furthermore, the historical distrust between academic Heads and central management was not conducive to accepting the CCM without question and the opportunity for debate was by-passed due to the 'presentation' of the CCM in the December 1995 meeting (by the HSP). The AHB was perceived[27] as being capable of understanding the CCM and when the AHB spoke out against it, with only superficial responses being given by the central management (HSP)

[27] Since this case study was completed the AHB has been promoted to a position within the directorate of the University and the school costing model has evolved in complexity over the years. Now that a much better understanding of the cost behaviour is held at all levels within the University it is generally accepted that the CCM was providing realistic information at the time. Therefore it was possible that the

an opportunity presented itself to the AHB. Given the fluid nature in which any perception is held (Tomkins, 1991), it was possible for the AHB to obtain agreement from the academic Heads that a revised model should be considered (a school costing model). This was relatively straightforward to achieve as the CCM had been discredited and the AHB now had the 'power over meaning' to influence the view held by others to create the perception that change was needed and was rationale.

6.2.1 Summary

Overall the inclusion of the change management literature, in this thesis, has enabled a richer account of the reasons for the failed implementation of the CCM to be given. These issues coupled with the apparent disregard for the ingredients that were considered important for successful implementation of new costing systems has provided a specific and detailed analysis of how not to go about implementing a new costing system within a University, although a lot of the issues raised are generic to many organisations (not just the university sector).

6.3 Research question three

The case study analysis provides the reasons why the CCM was not implemented, but it does not tackle the third research question, which goes to the very heart of costing systems developments in universities. In any manufacturing organisation the purpose of a costing system would be to cost the products that are produced (akin to the course costing philosophy), yet evidence suggests that universities are allocating overheads to schools, not activities within them. The third research question is thus:-

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AHB spoke out against the CCM due to a lack of understanding of it since the accuracy of the data

What is the justification for the development of a school costing model given the main benefit of a course costing system is to cost the individual elements within the department rather than a department as a whole and thus aid decision-making. Is there a conflict of objectives between a course costing system and a school costing system, or is there an alternative costing system that may be more appropriate for a university?

The following section addresses the issue of course costing versus school costing as evidence to date demonstrates that the majority of universities currently cost to the school level rather than to the course level (Mitchell, 1996) even though external pressure is being exerted upon universities to cost the main activities they undertake[28]. This section also provides an insight into some of the possible reasons for school costing to take preference in universities and debates the issues pertaining to alternative costing methodologies within universities.

6.3.1 Case for and against school costing

Mitchell's (1996) research identified that many universities were allocating overheads to schools so that the surplus or deficit could be identified in much the same way that was evidenced in the University case study. The fact that so many universities are employing this approach would suggest that it does have some merits and so far as the central university management is concerned, it does. This approach provides a clear view of which academic schools/ departments are generating the profits or causing a drain of resources within the university and thus, at the macro level provides a university with a straightforward system of accounting control.

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provided has been vindicated over time.

[28] Under the Transparency Review universities are required to produce costs of their main activities, classified as teaching, research and other.

At the school level many costs are directly controllable by the academic Head and this enables them to manipulate the school's financial position by identifying which of these costs require careful management. A significant downside to this, however, is that the individual activities of the school are not allocated costs and therefore it is not clear how such costs should be managed.

A school costing model is clearly not an alternative to a course-costing model. A university may exercise control by insisting that schools break even and it is therefore the school itself that may require some notion of how its costs change with different course mixes and numbers of students. An academic school, just as a manufacturing organisation, would want to know what its courses/ activities were costing so that attention could be directed towards those that were causing a drain of its resources. A university's central administration may be content with costing schools, but it should be the schools that would benefit from costing courses/ activities within a devolved organisation. This therefore, poses the question of how universities should do it.

Historically, universities clearly never saw a reason to cost their activities or the courses they operated. The reasons for starting new courses have been based predominantly on academic arguments rather than an accountant's financial model. However, as the financial environment in which universities operate becomes more difficult, the realisation is that costing of some description is required. It is suggested therefore, that universities have started to cost schools, as this is the easier option. Nonetheless, it is argued that school costing falls far short of providing all the information required for meaningful decision-making.

Different universities in different situations will have different requirements. Some will require a costing system as a static piece of information that can be well served by a full absorption approach. Others may require it to aid decision-making and therefore there should be a method to help in this regard. The following section will therefore debate a number of alternative techniques that could be used for a course/ activity costing system: -

6.3.2 Alternative one: variable costing

The way in which universities incur costs does not lend itself to the use of marginal cost analysis as the vast majority of costs are fixed in the short to medium term; most notably staff costs. If a model were created that identified the revenues and just the marginal costs of delivering a course it is very likely that a high percentage contribution would be shown, as there would be few truly marginal costs to deduct from the revenue. Thus, all courses within a school would show a positive contribution and this would demonstrate that all these courses were required to contribute towards the fixed costs of the school.

It could be argued that staff costs, whilst relatively fixed in the short term, should be apportioned to the courses and perhaps there is a case for using an averaging method of staff cost to arrive at a more meaningful 'contribution'[29] figure. This could then lend itself to some analysis akin to contribution per limiting factor of scarce resource. However, given a contribution per limiting factor it would be possible to rank the courses in an order, or even to attempt benchmarking within a university (or possibly

the sector if collaboration could be obtained). The problem with this technique is that it still does not provide the manager with relevant short-term information as fixed costs have been used as a surrogate for variable costs. Nonetheless, it is still a technique that provides information that is more meaningful than pure contribution, and if a medium term view were taken then it could, quite convincingly, be argued that those staff costs are variable and therefore this technique is fully justifiable.

Even the calculation of an average staff cost has inherent problems as these costs are not specifically attributable, or identifiable, to individual courses, research activity, administration or consultancy[30]. Such costs are relatively fixed and common to a range of activities. Data concerning the actual split of staff time to these is difficult to identify accurately and thus it is far easier to deal with such costs at the school level rather than attempt to allocate them, fairly subjectively, across the different areas of work that is undertaken. Furthermore, such costs may not be immediately avoided if a course is withdrawn, as the staff cost may remain within the school unless that member of staff were used exclusively on the course being withdrawn or can be transferred to another department, and thus be avoided.

The variable costing approach may have some merits, but the timeframe over which decisions are made will impact on the relevance of this approach. There are some difficulties in this approach for short term decision making; however, a medium term viewpoint may be more appropriate as many of the controllable costs within an academic department would be variable over this time frame.

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[29] Contribution has been inserted in quotes because it includes an averaging element of fixed cost, i.e. averaged staff cost and therefore strictly is not the deduction of variable costs from sales revenue.

6.3.3 Alternative two: full traditional absorption costing

At the course level the fixed costs that need to be absorbed are substantial and few costs are directly attributable to courses. A fully absorbed costing system is not appropriate for decision-making in the short to medium term as the relevant costs of making decisions are not clearly identifiable. Whilst some costs, however, may be controllable at the course level, they are in common with other courses or activities which cause problems as each decision will have a knock on effect onto other activities within a school and, potentially, within a university. A costing model using such principles will, however, show the full cost of operating a course and identify whether this course adds to, or deducts from, the overall surplus of the school.

In the current climate of funding, universities will have to manage their way through a difficult financial climate. However, in the medium to long term they will have to address their costs and course provision. Course costing could be used as a means of ensuring that the costs of delivery are less than the revenue generated and in the medium to long-term absorption costing will meet this need. This is akin to target costing (Kato, 1993) where a price is set and the service is structured in such a way as to ensure costs are below that price. Anecdotal evidence may suggest that some universities are attempting this through a reduction in student contact time, larger class sizes and identifying more efficient learning and teaching strategies. These approaches to cost reduction appear to be undertaken within a vacuum that is void of financial information concerning the cost profile/ behaviour of the courses that are affected. It is

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[30] These general activity areas have been highlighted as they are consistent with the Transparency Review requirements.

for reasons such as these that a course/ activity costing model should be developed and have prominence over a school costing model.

The traditional absorption costing approach does, however, have some problems in its application. The different subjective absorption bases can result in wide variations of absorbed costs and this in turn is not satisfactory for long run strategic mix changes because the different absorption bases would not provide consistent information. Furthermore, the long-term viewpoint of this approach would not help academic schools to balance their books year by year.

6.3.4 Alternative three: activity based costing (ABC)

Whilst the ABC approach overcomes some of the subjective arguments about cost driver identification it is still a long term planning tool. The evidence from Fernleigh University, and the literature in this thesis, has demonstrated what would be required to implement such a system. Even if the behavioural, educational and political dimensions could be overcome there is still the issue of whether ABC is relevant for activity costing. The ABC approach would be more appropriate than traditional absorption costing for longer term strategic changes in course mix, but this would imply ad hoc calculations when required and not necessarily an elaborately detailed routine ABC system of all courses at the academic school level.

6.3.5 Alternative four: managing bottleneck resources

If short term course mix decisions are to be made at the school level, it would seem that the within-school costing system must be relatively simple and this may include making the assumption that most costs, including full time academic staff, are relatively fixed.

This assumption may also apply to part time staff that are on medium term appointments, for example periods of two to three years. Therefore, the Head of school is likely to have to deal with relatively fixed resources, i.e. key bottleneck resources such as types of staff (different categories) and room space. Hence, one may argue that contribution should be expressed per unit of scarce resource (see variable costing above) or better still adopt some of the principles of the Theory of Constraints (Goldratt and Cox, 1984). This could include making an analysis of what the key constraining resource is for different types of courses each year and then analysing each course in terms of contribution per unit of those bottleneck resources.

6.4 Conclusion

The type of costing systems in place within a university must meet the needs of the organisation as a whole. It is of little benefit introducing a highly complex costing system within a university that neither has the will, or capability, of using it. It has been suggested that there are a number of factors that will affect the type of costing system that is required and a discussion relating to alternative costing systems has taken place in this chapter.

There is evidence that costing systems have evolved to the school level but have not gone much further than this despite the apparent lack of relevant decision making information that this gives academic schools. It is difficult to be conclusive and suggest which of the alternative costing systems would be best within a university. Much will depend upon how widely cost comparisons are being made (within or across a school) and within what timescale adjustments can be made to costs and student numbers. It may be possible that some types of universities/ departments have very little flexibility

even in the fairly long run so activity costing would be of very little value. At the other extreme, universities/ departments with a fair degree of 'commercial' courses might have choice over short run variations in staffing and courses. Some might have student number flexibility but not staffing flexibility and so on. Hence, context will be important in specifying what sort of costing analysis is to be used.

It could be argued that most universities would benefit from some type of ABC analysis at the university level (by central management), in order to occasionally review the longer-term strategic mix of courses and other activities. Many courses with similar resource requirements might be grouped together for this purpose, much as HEFCE does for awarding grants; hence keeping the analysis fairly simple. In between such strategic reviews, schools will need to understand the costs and benefits of feasible short run variations in course mix and that can depend on marginal costs analysis (variable costing or Theory of Constraints based). Of course, if a university abstains from anything to do with long run course mix strategy and exercises control solely by allocating revenues/ costs to the most profitable schools (or some other educational criteria), then each school will need, occasionally, to use ABC investigations when under pressure to change strategically. So context is important in trying to decide what form of costing is done where. But once one brings demand and resource flexibility-context into the argument as a determinant of costing approach, one opens Pandora's box because a range of external and internal contextual factors may influence costing system use. Simply collecting universities views on student number flexibility and resource flexibility and trying to correlate that with costing applications would almost certainly not explain a high proportion of university accounting practice.

There are many factors which the literature suggests might influence cost systems use and, in particular, it seems obvious from the limited work available that universities had not until fairly recently developed detailed course (activity)/ school costing systems and many may not have yet done so. This might be more to do with the pace of progress and diffusion of knowledge about costing by university administrations (and indeed the whole of the public sector), rather than resource/ demand flexibility.

Pondering on all of the above, the research process paused at this stage to consider how to carry this enquiry forward. It was then decided to proceed to examine to what extent university management accounting (including costing systems) had changed over the 1990s. The university sector experienced considerable change in that decade and so the nature of this change and how it affected each university would be explored; and also how that was associated with accounting system change. Hence, such a research approach would enable the researcher to comment upon the extent to which course costing (in its different forms) and school costing had developed, but, more importantly, to comment on the broader sweep of accounting change in university financial management, and what caused it. Chapter Ten (Table 10.14) provides an overview of the developments that have taken place in accounting systems, particularly in relation to course and school costing systems.

The discussion that has taken place in this chapter has raised issues that cannot be answered through the extant literature. These issues focus on the lack of knowledge of the evolution of costing systems in the university sector and the following section of this research will now turn to fill that knowledge gap.

The next stage of this research required a quantitative and more generalisable approach to be adopted as well as referencing a different, but related source of literature: namely Contingency Theory. Therefore section two of this thesis will address the literature, the research methodology and the statistical analysis of the data that was collected to understand the evolution of costing systems in the UK university sector during the 1990s.

CHAPTER SEVEN

A Review of Contingency Theory

This chapter considers the literature on Contingency Theory, and in particular the work of Gordon and Miller (1976), with the intention of developing a robust mechanism in which the specific peculiarities of the university sector can be captured and therefore related to the development of accounting systems. The next chapter will explore the methodology to be employed to verify the existence of the theoretical views being put forward here.

The extent to which the UK university sector's accounting system has evolved over the 1990s is relatively unknown, although, as will be demonstrated through this chapter, there is a substantial body of literature that suggests how various contingent elements may impact on the development of such accounting systems. The importance of contingency explanations of accounting is to identify the specific context that impacts on 'particular features of an appropriate accounting system' (Otley, 1980, pp.413) and therefore it will be necessary to capture such context through the research design. This will partly be catered for by Gordon and Miller's (1976) categorisation of the external environment into dynamism, hostility and heterogeneity. Furthermore, the internal environment will be analysed through the 'organisational structure' (Otley, 1980). The interplay of the various contingent variables on accounting systems evolution will be discussed below.

One could reasonably argue that there is a relationship between the external and internal environment. If the external environment changes and becomes much more competitive and hostile, then this ought to lead to a change in the internal makeup of the organisation. It may decide to devolve its operational powers and strategy making to a lower level. On the other hand, a defensive organisation may consider recentralising to ensure that decision-making is more tightly controlled. There is not, however, a one to one mapping of any such relationship and the decision to change internally may be as a result of many other factors rather than the changes taking place in the external environment. The relationship between these two environments exists, but the relationship is complicated through factors such as new management philosophies, available choices, time lag effects or resource availability.

This section of the thesis will provide an insight into the evolution of accounting systems within the UK university sector that has taken place during the 1990s. The timing of this research was critical in light of the Transparency Review, which was forcing all universities to adopt a universal approach to costing their activities. The forced approach of the Transparency Review has necessitated a change in accounting systems for the vast majority of universities and as such this is not a natural evolution, therefore the contingent literature would not be so relevant. This research, however, was able to capture the natural evolution process that had taken place in the sector as it was conducted prior to the Transparency Review forcing wholesale accounting system changes. Therefore an analysis of a natural evolution of accounting systems was possible, which could be studied along side Contingency Theory.

7.1 Contingency Theory

It was suggested in Chapter Six that there is no one universal accounting system that meets the objectives of all organisations (Otley, 1980). Further, it is suggested that certain quantifiable aspects will affect the development and use of accounting systems. These quantifiable elements are referred to as the environment, organisation, technology, and by some authors, strategy (Chandler, 1962; Mintzberg, 1973; Miles and Snow, 1978). The literature suggests that that these elements impact upon sectors and organisations differently and also in the way that they affect the evolution of accounting systems (Chapman, 1997). Furthermore the evolution of the accounting systems can be different even within the organisation at the departmental level.

To clarify: the environment can be viewed holistically at the macro level; it affects different parts of the economy in different ways and one could argue that the type of accounting system in the financial services sector is very different to the needs of the manufacturing sector. However, if one homes in on one sector then the accounting systems in place even within that sector may also be different. It is argued that through the analysis of the contingent variables a range of accounting information systems emerge that are affected by these broad contingent variables. Another way of looking at this is that composition and use of accounting information systems is, generally, specific to the type of organisation. The definition of 'type' however, depends upon how the contingent variables manifest themselves within the operating environment and structure of the organisation.

In the words of Otley (1980), 'the contingency approach to management accounting is based on the premise that there is no universally appropriate accounting system which

applies equally to all organisations in all circumstances' (*ibid*, pp.413). Rather it is suggested that particular features of an appropriate accounting system will depend upon the specific circumstances in which an organisation finds itself. Thus a contingency theory must 'identify specific aspects of an accounting system which are associated with certain defined circumstances and demonstrate an appropriate matching.' (*ibid*, pp.413)

7.2 Contingent factors

These specific aspects are further expanded upon by Otley (1980) as being:-

7.2.1 The effect of technology

It is argued that the 'production process' will affect the type of costing system that would be used. A production facility that produces individual products to specific criteria will require a very different costing mechanism to one that is geared up to mass production with high joint fixed costs. In the former, costs are allocated to the product, whereas in the latter costs must be apportioned on an agreed basis to the mass of products that are produced. The spectrum of costing requirements that is possible will result in a number of different management accounting information systems being developed to meet the needs of the individual organisation. Thus as the production technique changes from process production, through mass production, large batch, and small batch to unit production (Woodward, 1965), the accounting system should reflect this by increasing the level of detail and accuracy that can be provided.

It could be argued that the university sector can be likened to a process, whereby students enter the system, are educated and leave. The process of education and research within a university would lead one to analogise the effect of technology as being close

to the process production end of the spectrum. Thus to follow this logically, the accounting information system within the university sector should have less detail and accuracy as most of the costs need to be apportioned rather than allocated.

Burns and Stalker (1961) describe 'technological uncertainty' as a contingent factor although this appears to blur the boundaries with the external environmental variable (below). Technological uncertainty includes: -

- Process invention; improving an existing productive activity,
- Product invention; creating a new product and
- Technical change, which measures the perceived strength (by managers) of competition in the sector.

These three sub-categories of the technological variable result in measurement difficulties because it is argued that each of them can be likened to sub-categories of the environment (as per Gordon and Miller, 1976). Briefly, process invention, such as utilising more information technology to deliver courses, blurs the boundaries with the dynamism and heterogeneity categorisation of the external environmental as these elements of the environment measure the rate of change and the degree of difference that exists in elements of what universities do (for example, teaching methods on courses). Likewise product invention within the university sector is the development of new courses, which could be argued to be a measurement of dynamism and hostility because a reaction to a more hostile (competitive) environment may be to diversify the range and scope of courses to spread the risk associated with such increasing hostility and change in the environment. Finally, technical change relates to competition, which is implicitly within the environment. The inter-relationship of the technological and

external environmental contingent variables is thus apparent and this may result in the technology contingent variable being difficult to measure in isolation.

7.2.2 The effect of organisational structure.

It has been suggested that the degree of interdependency between departments will affect how the budget is used within an organisation. Hopwood (1972) suggested that where there is a high degree of interdependency between departments then the way in which the budgetary information is used would impact upon the performance of departments. Hopwood suggested that if meeting the budget is used as the sole, or primary, factor for measuring performance then adverse side effects emerge; whereas if wider factors than simple adherence to the budget are used, the overall performance and general behaviour of staff is improved. He thus advocated the accounting system should look at, and therefore include, a wider range of performance measures than just meeting the budget. Contradicting this view, Otley (1978) found the reverse to be the case; a rigid style was likely to lead to improved performance. Upon further analysis a contingent explanation was put forward, namely that the fundamental difference between these two studies was the degree of interdependence (Hopwood, 1972) and the lack of interdependence (Otley, 1978). This confirmed an earlier study by Baulmer (1971) where it was suggested that a rigid use of performance measures was inappropriate where there was extensive interdependency.

Thus it would seem entirely appropriate to suggest that as the degree of interdependency increases within an organisation then the accounting system should be capable of more flexibility when it comes to measuring the performance of the business unit. This may be different from what has been suggested earlier in that it is possible to have a broad

range of performance measures, yet these can be rigidly applied. It is suggested here that the accounting system should be capable of constant flexibility as the degree of interdependency increases rather than measuring a broader range of factors to assess performance. Such a range of measures, for the longer term performance measurement, would necessarily include non-financial aspects. The use of the non-financial aspects within an accounting system is verified by Gordon and Miller (1976) who suggest that this should be incorporated as dynamism and heterogeneity in the external environment increases.

This suggests that a number of contingent variables should lead to more non-financial data being incorporated into an accounting system as the degree of interdependency, dynamism and heterogeneity increases. Dynamism and heterogeneity are defined (Gordon and Miller, 1976) as:-

- Dynamism – the amount and unpredictability of change in consumer's tastes, production or service technologies and the mode of competition in the firm's principle industries.
- Heterogeneity - the differences in competitive tactics, customer's tastes, product lines and channels of distribution across the firm's respective markets.

7.2.3 The effect of the external environment

The 'environment' is a term used to explain a number of facets. For Khandwalla (1972) it is the degree of competition faced by a firm and for Gordon and Miller (1976) it is the degree of hostility (price, product, technological and distribution competition). These two authors suggest that as competition/ hostility increase, then the accounting system should become more complex and sophisticated. Further, as alluded to above, Gordon

and Miller suggest that external environmental factors can be sub analysed into dynamism, hostility and heterogeneity, each of which impacts upon the appropriate type of accounting system that would be needed. Otley (1980) identifies another facet, that of the operating environment - whether it is tough or liberal. Each of these points, it is suggested, are covering the same broad concept of the environment and is not mutually exclusive, but rather complimentary in nature. The more competitive the marketplace, the greater the dynamism and heterogeneity, and the tougher the operating environment. This broadly suggests that the accounting system should become more sophisticated, more complex and have the potential to evaluate managerial performance in different ways.

These three specific contingent variables (technology, organisational structure and environment) are those that are most often put forward as factors that affect the design of accounting systems. Gordon and Miller (1976) have already unpacked one of the variables and provided an insight into how three sub sections of the external environment could affect the design of accounting systems. Gordon and Miller also suggest that another contingent variable is important; that of the decision making style of the firm. For example, a firm may undertake substantial analysis, consider multiple aspects of the decision and be adaptive and responsive to changes. Thus, the more analytical, multiplexing, adaptive and responsive the firm is in making decisions the more sophisticated and complex the accounting system needs to be.

7.3 Gordon and Miller methodology

Gordon and Miller's (1976) research portrays a detailed picture of the interplay of various factors that affect the design of accounting systems within the firms they

analysed. Some of these factors have been mentioned above, but a more detailed review of each of these will now be provided, as this thesis will use the general philosophy to evaluate the changes and development of accounting systems within the UK university sector. This section reviews the three broad areas of the environment, the organisation and the decision-making styles with their respective sub categories as this is pivotal in defining the second section of the research.

7.3.1 External environmental factors

Within the external environmental factor there are three sub-categories that are further defined which affect the development of accounting systems, being: -

7.3.1.1 Dynamism

Dynamism refers to the rate of change in the external environment and it is argued that the degree of dynamism of the external environment affects the type of accounting system. The external environment can range from very stable where the tastes of the consumer are predictable through to a very dynamic and changing environment where the tastes of the consumer shift rapidly. In the period up to when the 'binary divide' between polytechnics and universities was removed (1992) the university sector, it is suggested was more towards the stable end of this spectrum. Whilst there had been some growth and changes in the sector, the demand for traditional degrees was reasonably stable, although some new degrees were developed to meet the changing needs of students. The students' demand did not shift radically, yet it is was not totally constant. A conservative estimate of the external environment would perhaps indicate that the university sector was skewed towards the stable end of the spectrum.

The university sector may still be at the stable end of the spectrum compared to sections of the private sector where demand can change dramatically due to technological advancements or changing consumer tastes. Universities are protected to some extent from such dramatic shifts but the university environment has experienced some changes over the past decade or so. The Research Assessment Exercise (RAE), league tables and Quality Assurance Assessments have resulted in a competitive environment being created amongst all universities. The issue is not about comparing the rate of change in the university sector with that of the private sector but about identifying the degree of change that has taken place in the university sector over the time period (early 1990s to 1999). Coupled with this is how, if at all, accounting systems have changed in accordance with any increase in dynamism in the sector.

Gordon and Miller (1976) argue that, as dynamism increases, the accounting system will require an increase in the following areas:-

a) The element of non-financial data,

b) The frequency of reporting and

c) A greater use of forecast information

The issue of frequency of reporting is backed up by work conducted by Cook (1967) who advocated that increasing the level of reporting will lead to an improvement in management's performance. This point cannot be totally subscribed to in the university sector for two reasons. First, the general point that increasing the frequency leads to improvements in performance is questionable. This may be so up to a point and depends on the content of such reports. Too much information, too frequently will lead to an overload of information and the opposite of an improved managerial performance may

be evident. Secondly, and specifically in the University researched earlier in this thesis, an issue was raised that the academic Heads were appointed for their academic acumen, not necessarily their financial understanding. Under this scenario it is likely that Heads would prefer less frequent reports due to the pressures on their time. However, if such reports only provided the most crucial of information then they may be brief, yet frequent. This could be a possible solution to this problem. Nonetheless, this research will identify the extent to which such reports are used or are available within the universities. Furthermore, it will identify whether there is any evidence that the academic departments access these reports (either of a standard makeup or bespoke).

7.3.1.2 Heterogeneity

The second sub-category of the external environment is heterogeneity. This refers to the degree of difference concerning, for example, the course portfolio, the student demographics and research and consultancy activities of a university. It is argued that as the students, courses and possibly delivery of courses become more diverse then the accounting system needs to reflect a university's divisionalised nature. A university does in fact offer a wide range of courses that are compartmentalised into faculties or schools and an accounting system should be pitched at such a divisionalised level. Although courses are compartmentalised, faculties/ schools differ in the courses they offer. Some may be very focussed and offer a standard range of undergraduate courses, others may offer a very diverse range. A standard range could be described as one that has a common degree of input resources, options available and similar number of degree programmes. Thus the type of accounting system will need to reflect the requirement of the individual school and this may necessitate different levels of sophistication. In essence, it is suggested that such an organisation needs to create a decentralised system

of reporting in order for the accounting system to be effective. Furthermore, the amount of information may differ depending on the composition of the course portfolio within each faculty/ school.

7.3.1.3 Hostility

The final sub-category of the external environment is hostility. This refers to an increase in competitiveness and an organisation's ability to survive in the changing environment. As the competitive nature of the marketplace increases, the accounting system needs to reflect this in several ways:-

a) Increased frequency of reporting,
b) Increased amount of non-financial information to reflect the threatened variables that may not quantifiable and
c) Increased complexity.

These points are interesting as a potential conflict arises. Universities were, it is suggested, in a relatively stable environment. However, over the period of this research, the competition for fulfilling student places has increased due, in part, to the funding pressures being exerted upon them. If the above three points (a to c) are true then the process of managing an accounting system will become an issue. This research has already demonstrated that the implementation of a costing system failed, *inter alia*, because it was perceived as too complex, yet Gordon and Miller (1976) advocate a complex system to meet the challenges of a hostile marketplace. In fact, additional research (Khandwalla, 1972) confirms the view that complex systems are required in highly competitive markets. If this is the case then Gordon and Miller (1976) and Kwandwalla (1972) seem to be at odds with the earlier findings of this research and

other comments (Horngren, 1990; Innes and Mitchell, 1991) that over complexity may result in problems with the implementation stage of such an accounting system.

Whilst competition for university places has increased during the 1990s, this research will need to examine the need to balance the degree of complexity of the system with the amount of competition in the marketplace. It may be the case that competition is increasing yet this is not a highly competitive market in the sense that Khandwalla (1972) uses the term.

7.3.2 Organisational factors

7.3.2.1 Decentralisation

Gordon and Miller (1976) argue that external environmental factors have an impact on the organisational structure of the firm. As the market place becomes more dynamic, heterogeneous and hostile so a company will seek to cope with this more complex operating environment. One way of so coping is to decentralise the organisational hierarchy and to create smaller sub units to deal with the complex matters.

Such decentralisation may be evident in many universities and this research will need to capture any changes that have occurred in the organisational structure over the period of this research and relate this to increasing dynamism, heterogeneity and hostility of the external environment. Decentralisation and creation of sub units does however have potential bureaucratic drawbacks, which can lead to dysfunctional behaviour (Argysis, 1964), and lead to an inability of the whole organisation to change its strategic direction swiftly as it is no longer being 'steered' from the top.

If decentralisation is necessary then the accounting system in place needs to be capable of reporting at an appropriate level, i.e. at the sub unit level. The accounting system must therefore be able to produce detailed reports at the decentralised level and produce summary reports for senior management to monitor the performance of the sub units. An analysis of the actual information being provided to/ requested by managers within the universities will help to analyse whether the data is relevant and useful.

Gordon and Miller (1976) also advocate 'a sophisticated planning and control system' to allocate resources to the sub units in a decentralised environment, yet earlier work in this thesis shows that this is not without some serious problems. More interesting is work undertaken by Godfrey (1971) who goes so far as to suggest that organisations should use short-run planning models that will promote divisional autonomy. Short-run planning models would almost certainly cause 'short termism'; i.e. managers seeking short-term rewards at the expense of the longer-term goals of the organisation, which in itself is longer-term dysfunctional behaviour.

7.3.3 Limited resources

Earlier in this thesis it was suggested that to some extent there may be scarce resources within the university sector, for example room availability, finances and staff time. Such limited resources need to be monitored through an effective accounting system if these resources are to be used optimally and this research will seek to identify if this is being catered for in existing systems.

7.3.4 Decision making styles

The approach to making decisions in an organisation can range from autocratic through to democratic as was demonstrated in the University case study. The management style changed from one person making all the decisions to the decision-making powers being shared amongst the relevant academic Heads.

Not only is the collective bargaining nature, or otherwise, of decision making important, but so also is the type of decision being made. This too could range from conservative through to dynamic.

It is hypothesised that the changes that have taken place in the university sector during the 1990s have caused many universities to become much more proactive in their style of decision making through the use of competitor information. Therefore, opportunities can be taken advantage of rather than seeking to minimise the threats. Whilst these are not mutually exclusive, it is hypothesised that there has been a change in the information that is being used to affect decisions, such as the formal evaluation of competitors' actions.

7.3.5 Adaptability

Gordon and Miller suggest that under circumstances where decentralisation takes place the decision-making process will become more analytical of the data surrounding the organisation and the accounting system needs to be able to cope with this (perhaps, less financial) data. Numerous authors (Ackoff, 1964; Thompson, 1967) claim that the more dynamic the market place the more adaptive the decision making process needs to be to cope with the changes in the external environment.

7.3.6 Time frames

Management within universities may be concerned with the immediate academic year and/ or the longer-term issues surrounding their faculty/ school if they operate within a decentralised environment. If too much attention is focused towards the short term then dysfunctional behaviour may arise as alluded to earlier. An appropriate accounting system therefore needs to be aware of such short-termism and direct managers' attention towards the longer-term goals.

An example of short termism will be given with regard to transfer pricing within a university. Theoretically an optimum transfer price is set which motivates both managers to supply and demand an appropriate level of service from one another. In a university environment, the transfer price of service teaching can cause problems if a fully devolved organisational structure is in operation. The market cost of a part-time teaching hour is far below the fully absorbed cost of an hour's teaching by a full-time member of staff. Admittedly, the full-time staff cost will include such costs of administrative support, pastoral care and course development. Personal experience, of the author has shown that this can lead to decisions being taken that concentrate on the marginal cost of the hour rather than the additional services provided by the full-time member of staff. If too much emphasis is placed on the surplus figure generated by each faculty/ school then there is a danger that service teaching will be replaced (if university rules permit, or are circumvented), by part time members of staff purely because of the financial benefit. This short-term action may result in fewer core full time staff being employed and could result in a longer term lowering of the quality of tuition, course

development and research because the experienced full-time staff have been replaced by part time staff.

The accounting system needs to avoid dysfunctional short-term behaviour and should, as Gordon and Miller suggest, force managers to think more about goals, programs and the future of the organisation.

7.3.7 Reactivity

Reactivity relates to the extent to which accounting systems are developed out of provocation. It could be argued that many universities are being provoked into creating new systems because of the pressures being exerted upon them (most notably the Transparency Review but less so the HEFC recommendations on good practice, HEFCE, 1995b).

The concept of reactivity could also relate to the extent to which new courses are developed. The opposite would be that universities are being proactive in developing new courses in an attempt to be ahead of the competition. Such a proactive approach to course development, perhaps in line with Sir Ron Dearing's view that courses should be vocationally relevant and therefore new courses may be developed, requires a distinctive accounting system. The accounting system needs to enable managers to consider new markets for old courses, old markets for new courses and/ or new courses for new markets. Notwithstanding this, an accounting system should also be capable of providing the same information for research and consultancy activities of a university where in some, particularly the 'old' universities this has an equal, if not higher, priority to course development.

7.4 Linking the factors

It is argued, by Gordon and Miller (1976) that the external 'environmental, organisational and decision making traits are not distributed randomly but actually cluster together to form commonly occurring configurations' (pp. 65).

Miller (1975) identified a number of models based on his view that the above variables cluster to create configurations. Three such models, or archetypes, were identified; the adaptive firm, the running blind firm and the stagnant bureaucratic firm.

It is hypothesised that parallels can be drawn between the stagnant bureaucratic archetype and the university sector as will be discussed below.

7.5 The stagnant bureaucratic firm

Stagnant bureaucratic firms are said to be ones which 'have been in an extremely stable and homogeneous environment. However, dynamism and heterogeneity have recently been increasing and ... structural and decision making styles are still geared to conditions of the past' (Gordon and Miller, 1976, pp.67). This might characterise the higher education sector prior to the explosion of student numbers and the removal of the binary divide between the old polytechnic and university sectors, the introduction of the RAE, Quality Assessments etc. in the early 1990s. Since the creation of one sector, it is hypothesised that the market place has become a lot more dynamic and courses have become more widely diversified.

The stagnant bureaucratic firm is also said to have a centralised system of control, decision-making occurs without adequate analysis, is unresponsive and is conservative. Such a firm could be likened to an autonomous unit operating within an insular environment having no regard for the external marketplace. It is suggested that these were the attributes of the higher education sector up to the point at which various external pressures (financial, competition, other stakeholders) increased.

In order to manage such external pressures, it is suggested that universities need to undertake a number of tasks to create a more appropriate and effective accounting system. These are:-

1. Collection of market-orientated data to ensure that new and existing courses; research and consultancy activities are meeting the requirements of the stakeholders. Trends, projections, market share and primary data may be particular components of this data. Historically universities have had to keep separate accounting records of each research grant that was awarded (for external sponsors), but no such records have been a requirement for individual courses. It is suggested that the desire to keep separate accounting records is increasing, not because of an external requirement to do so, but for internal management information.
2. More attention should be directed towards financial forecasting in the short to medium term at a decentralised level. This will concentrate the minds of managers to the future rather than the present and, if the planning horizon is sufficiently long enough, then it should deter dysfunctional behaviour and short termism.
3. Adequate and timely reports should enable a comparative check to be made between actual and expected results. This may be qualitative as well as financial.

4. If considered appropriate, a move towards performance indicators may assist the monitoring of the newly created and therefore more autonomous units within the university.

These four areas are revisited and discussed in Chapter Fourteen (section 14.2.1)

7.6 Conclusion

Contingency Theory has been reviewed to demonstrate the interplay of various contingent variables in the development and evolution of accounting systems. It is envisaged that this general theory will have had an application in the university sector over the period of this research as the second stage of this research was undertaken before the Transparency Review had affected the evolution process of accounting systems in the university sector.

The Gordon and Miller (1976) research has been specifically referred to as it is suggested that there are parallels between the stagnant bureaucratic firm and the university sector, especially around the period of the early 1990s. The research methodology that will be described in the next chapter will explain how the Gordon and Miller findings have influenced the design of the second section of this research, but will also make reference to the broader contingent literature which is in line with the general philosophical underpinning of this thesis.

Finally a number of broad research questions emerge from this review and these are detailed below: -

1. To what extent do the findings of Gordon and Miller (1976) help in understanding the evolution of accounting systems in the UK university sector?

2. To what extent does the broader contingency theory help in understanding the evolution of accounting systems in the UK university sector?

As the research methodology is described these two broad research questions will be expanded upon so that it is clear how the second stage of this research will enhance the knowledge of accounting system evolution in the UK university sector.

CHAPTER EIGHT

The Questionnaire Research Methodology

The issues identified in the previous chapter have developed two broad research questions as detailed at the end of that chapter. This chapter now describes an effective methodology that was used to evaluate the changes that had taken place in the university sector and to ensure that the data collected to meet this requirement was reliable and valid. This chapter overviews a quantitative methodology and therefore is a departure from the qualitative methodology (case study methodology) adopted thus far. It should be made clear from the outset, however, that the nature of this research still fits within the inductive paradigm that was outlined in Chapter Two. The quantitative methodology is a means of obtaining the data, although the interpretation is allowed to permeate through the statistical analysis rather than being subject to strict hypotheses.

Furthermore, whilst the Gordon and Miller (1976) research was used to inform the research design and questions, it was not the intention to force the university sector into the three common archetypes as defined by their research. A robust methodology will be described in this chapter that uses appropriate statistical techniques, yet permits the data to tell its own story rather than being constrained by a cluster analysis technique that seeks to identify a defined number of clusters.

This chapter will concentrate on the development of the questionnaire and the general features of the research methodology. Chapter Nine will describe the statistical techniques of Factor Analysis and Multi-Dimensional Scaling.

8.1 Quantitative methodology

As this section of the research employs a quantitative methodology, it is reasonable that sufficient consideration be given to the issues that such a methodology raises.

In the previous chapter it was noted that contingent variables might affect the evolution of accounting systems differently even within the same sector or at levels within a sector. Therefore, in order to capture this feature, the research instrument must be carefully constructed and in this case the research instrument was a questionnaire. A questionnaire was selected as it provided a mechanism for obtaining a large amount of data in a reasonable timeframe. The actual approach to obtaining the data will be described in full below.

Given the changes that had taken place in the university sector over the period of study, it was expected that the vast majority of universities would be evaluating their accounting information systems or new developments would be emerging. It was thought that even within a university some faculties/ schools might be developing their own complex accounting systems, which may be affected by the degree of heterogeneity as alluded to in the previous chapter.

8.2 Using a questionnaire

If there is no universal accounting system for all organisations then it is reasonable to expect different requirements of an accounting system within sectors and even within specific organisations. If universities are no different to this general case then it should

be anticipated that accounting system requirements and developments would differ within a university[31]; therefore the questionnaire should capture this.

In order to achieve this, two questionnaires were developed. The first was aimed at the general university management (finance director level) where questions were posed concerning the general changes to that university as a whole as well as more detailed external environmental, organisational and accounting system questions (Appendix 4). The second questionnaire (Appendix 5) was targeted at an academic department (a sub unit within the university) to identify how the specific changes within that department had impacted upon the evolution of an accounting system. This second questionnaire was sent to two types of academic department within each university – a business related department and a non-business related department so that it could be seen if the type of department itself was significant in the evolution of accounting system characteristics.

8.2.1 Sample population

The questionnaire was sent to all[32] UK universities (Appendix 6) that offered, and had been offering, undergraduate and postgraduate courses since 1990/91 (the time just before the binary divide between universities and polytechnics was removed). Such a point in time represented a snapshot of the sector immediately before there were significant changes that affected all universities (i.e. increase in higher education provision, increased competition in research and teaching, tightening financial

[31] It is recognised that the HESA (Higher Education Statistical Agency) return that all universities must complete annual will have had an impact on the accounting codes that are used within a university, but this will not necessarily have impacted upon the degree of devolution of accounting within a university.
[32] Full list of eligible universities was obtained from UCAS listings, FT league tables and the British Accounting Review register.

conditions etc.) That specific point in time was identified because those issues may have been a catalyst for change and could have provided universities with an added impetus to become much more business orientated and this could have affected the development of their accounting systems.

The population did not include those establishments that offered higher education courses in addition to other qualifications (e.g. colleges or university colleges that were listed by UCAS), as the purpose of this research was to identify how the higher education sector had responded. To include those would have resulted in other factors having to be taken into consideration (i.e. further education issues) that would have distracted from the focus of this research. The polytechnic sector institutions had changed their titles following The Higher Education Act (1997) and a complete listing of former names and new names was provided in the British Accounting Review Research Register (Gray and Helliar, 1994; see Appendix 7). The ability to identify the origin of the specific university that responded to the questionnaire was important as this enabled a further avenue of analysis of the questionnaires - it was possible to identify if the type (old or new status) of university was statistically significant when it came to the evolution of accounting systems.

8.2.2 Specific problems identifying the population

Identifying the UK universities does not seem to be an onerous task, however there were a number of issues that had to be overcome in order to be confident that the list was complete and valid.

First, a starting list had to be obtained and two sources were initially considered; the 1997/98 UCAS listings and the Times University League Tables. The UCAS listing included all institutions that offered higher education level courses as part of their portfolio. As this research was particularly interested in the UK university sector then including institutions that offered further and higher education would not be appropriate. This would have introduced further complications into the questionnaires, as funding for further education is different to that of higher education then the development of accounting systems would have been clouded by the different external pressures.

Once a listing had been obtained it was crucial to eliminate those institutions that did not fall into the required category and obtain a definitive list. Specific problems concerned the apparent differences between the listings. For example, Cranfield University appeared in the UCAS listings but not in the 1997 Times University League Table; the University of London did not appear as a single entry in either listing but as numerous colleges in UCAS and only three times in the Times League Table. Further complications surrounded the University of Wales.

In Wales, strictly there is one university; the University of Wales. However, there are six constituent institutions of the University of Wales; Aberystwyth, Bangor, Cardiff, Glamorgan, Lampeter and Swansea. Each of these offered degree courses in their own right, even though the University of Wales would confer the degree. This looked anomalous to one university and six colleges and one may reasonably question how this differed to, for example, the University of London and its related colleges. The major difference was that the Welsh universities offered similar courses, for example each

offered an accounting related course. The colleges of the University of London were split up into discipline specific academic units therefore they were absolutely different and that was the justification for including all six Welsh institutions and only one University of London. Thus, in total, there were 93 institutions in the population,

8.2.2.1 Contact details

When considering the practicalities of sending a questionnaire it was obvious that the address should be correct. Addresses of these institutions were found in the various prospectuses, however many had different buildings for the different faculties or disciplines. In order that consistency was applied, the addresses for 87 of the 93 institutions were taken from the 1998 edition of The British Accounting Research Register (Gray and Helliar, 1998); the same publication as used to identify the change of titles of the old polytechnics. This publication is produced every two years, hence the 1998 edition was used for the questionnaire that was sent in late Spring 1999. This publication only detailed those institutions that offered accounting related degrees. The remaining six institutions' addresses were obtained from a link from the Wolverhampton University Web site[33], which provided a UK map detailing the geographical position and link to the respective institutions. Of these remaining six universities the addresses of business related faculties were obtained.

As mentioned earlier, three questionnaires were sent to every university. One was sent to each of two different academic departments (business and non-business related) and a slightly amended version was sent to the general university management (finance director level). The British Accounting Research Register contained the addresses of the

accounting related departments as well as named contacts within that discipline area. Obtaining a specific name and address was the best way of ensuring the questionnaire was delivered to the appropriate person, however this was not always possible. Under circumstances where the addressee could not be confirmed the covering letter was addressed to the office of the respondent.

8.3 Specific objectives of a questionnaire

Questionnaires should only be as long as necessary to meet the objectives of the research. It was crucial that the objectives were made clear at the outset so that the research had its boundaries defined. In this instance the general objective was *'to evaluate the degree of change in the various contingent variables and the degree of change in the accounting systems within universities'*.

Within this general objective, there were more specific objectives that related to the development of accounting systems. These objectives were considered under two main headings as the research sought to evaluate the external environmental variables in isolation (Gordon and Miller approach) and secondly to consider the broader contingent variables. Therefore the specific objectives were: -

8.3.1 External environmental contingent variable

- To understand the extent to which the external environmental contingent variables are associated with the evolution of accounting systems within the university sector.

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[33] http://www.scit/wlv.ac.uk/ukinfo/uk.map.html

- To understand the extent to which the status of the university (old or new) is significant when considering the external environmental contingent variable as it affects the evolution of accounting systems.
- To understand the extent to which the type of department (business or non-business related) within the university is significant when considering the external environmental contingent variable as it affects the evolution of accounting systems.

8.3.2 Broader contingent variables

- To understand the extent to which all the contingent variables (including the external environment and organisational structure) are associated with the evolution of accounting systems within the university sector. This objective will be analysed at the sub unit level as well as at the macro level of the university.
- To understand the extent to which the status of the university is significant when considering all the contingent variables as they affect the evolution of accounting systems.
- To understand the extent to which the type of department within the university is significant when considering all the contingent variables as they affect the evolution of accounting systems.

The questionnaires were designed to evaluate the degree of change that had occurred within the university (or academic department) over the period of the study and therefore the questionnaires were reasonably complex. It is worthwhile providing a detailed description of the questions and their place in the research now so that these can be related to the specific objectives of the study.

8.4 Questionnaire to the academic departments (business and non-business related)

The questions were developed with due regard to the contingent issues raised in the previous chapter (in particular the work of Gordon and Miller) and changes that may have taken place in accounting systems. The issues were placed under headings that were meaningful to the recipient of the questionnaire (Appendix 5) and each of these is highlighted below.

8.4.1 Questions one – six inclusive (Q1-Q6)

The first two sections are headed 'concerning teaching' and 'concerning research'. These questions evaluated the degree of change that had taken place in the external environment (one of the contingent variables). As previously stated, the external environment was sub analysed by Gordon and Miller into three further areas of dynamism, heterogeneity and hostility and these three sub sections have been used to generate the questions for the first two sections. As discussed in the previous chapter, it is difficult to pose questions that capture just one element of the sub sections that were identified by Gordon and Miller. Therefore, Appendix 8 identifies the specific areas of dynamism, heterogeneity and hostility that were measured by the questions in this section of the questionnaire.

Where this research differs from the Gordon and Miller methodology is in the approach adopted to collect the data. Gordon and Miller used data from case studies where they identified the degree of dynamism, heterogeneity and hostility that each firm had faced over the period of their research. As a questionnaire was the preferred survey instrument

of the present research (no secondary data sources being available for such a comprehensive study), then the understanding of what dynamism, heterogeneity and hostility meant had to be 'unpacked' and presented in a way that was understandable by the recipient. Therefore considerable thought was necessary to consider how these three areas could have impacted upon the main activities of universities over the period being researched and these were broken down into the two mainstream activities of (a) teaching and, (b) research. It became apparent at an early stage that it was proving very difficult to isolate one of these variables in a succinct question, therefore as Appendix 8 shows, each question does not singularly evaluate an individual variable but a combination of two or all three of them.

8.4.2 Questions seven – twelve inclusive

This section concerned the market research activities of the universities. It was developed with due regard to the suggestion put forward in the previous chapter that universities could be likened to stagnant bureaucratic firms and that such firms should be collecting and using market-oriented data to ensure that their activities are meeting the needs of their stakeholders given the increase in external pressures (financial, competitive etc.). This series of questions provided an overview of how much change there was in the sector. Through appropriate statistical analysis it was anticipated that an insight would be provided into whether these are significant in the change process of accounting systems.

8.4.3 Questions thirteen – eighteen inclusive

In the previous chapter organisational structure was highlighted as an important contingent variable. This section was therefore designed to measure the degree of

change that had taken place in operating authority over the period of the study. Both Otley (1978) and Hopwood (1972) identified the degree of interdependency between departments as being a factor in the evolutionary process of the accounting system. This section evaluated the degree of devolvement of operating authority over the period of the study (early 1990s to 1999) as well as the change in influence the department had in certain key decisions; thereby measuring the changes in interdependence between departments.

8.4.4 Questions nineteen - end

The final set of questions, although set out in sub-sections, evaluate the changes that had taken place in accounting systems over the period of the study so that any significant changes could be identified as being associated with changes in the contingent variables. Although the main purpose of these questions was to provide a basis for understanding the broad development of university management accounting and its contingent influences, answers to these questions may also shed some light on the extent to which universities were considering the issues of course and school costing as well as the management of bottlenecks as discussed in Chapter Six. In so far as this is possible, this will be discussed in Chapter Ten, (see Table 10.14).

Finally, the only contingent variable that has not been explicitly described and evaluated in the questionnaire is that of the technological variable. Burns and Stalker (1961) provided sub-definitions of the technological variable into process invention, product invention and technical change as referred to in Chapter Seven. Process invention involved improving an existing productive activity such as using IT to deliver courses (see question 2 (Q2) of the questionnaire), whereas product invention involved creating

a new product such as changing the range of courses on offer (see question 5 (Q5) of the questionnaire). The final definition of technical change referred to the competition faced by the organisation specifically and within the sector and this is captured through the questions in the first two sections of the questionnaire (questions 1 to 6 inclusive (Q1-Q6)) and also question 11 (Q11). Thus the technological contingent variable is evaluated, but as mentioned in Chapter Seven it does blur the boundaries with the external environmental variable.

8.5 Questionnaire to the general university management (finance director level)

This questionnaire (Appendix 4) had many similarities with the one described above and as such only the differences will be highlighted in this section.

As Appendix 4 shows, Question 1 sought to evaluate the range of changes that a university had experienced over the period of the research to build a picture of how stagnant or dynamic the external environment was.

There were less specific external environmental questions posed in the 'concerning teaching' and 'concerning research' subsections, as many of the questions posed at the departmental level would have been specific to the type of courses. It was not appropriate to ask these questions at the general university level due to an expectation that different departments would be experiencing change at different rates. Thus it was likely that responses would have been 'averaged' at the macro level of the university.

In relation to the 'market research' questions, the only question to be omitted was Question 11 (see academic department questionnaire – Appendix 5) as this referred

specifically to external environmental questions that were not asked of the general university management.

Questions relating to the accounting system were identical except for the following four questions:-

1. Question 19i... to seek clarification on the approach used to allocate revenues within the university;
2. Question 27 to identify if the financial gearing of the university had changed over the period of the study;
3. Question 28 to identify whether there was change in the approach adopted to evaluate projects, as these would often have been at the university strategic level rather than at the individual department level.
4. Question 30 to identify whether a specific approach to course/ activity analysis had been undertaken. This would have given an indication of an adaptive (Gordon and Miller, 1976 archetype) type of organisation if it could be shown to be significant.

This questionnaire was structured in such a way as to avoid too many differences between the two sets of questionnaires so that as much comparative statistical analysis could be undertaken as possible.

The following section will now discuss the issues surrounding the use of questionnaires generally as a survey instrument and consider those that were relevant to this research.

8.6 Methodological issues

When considering the use of questionnaires a number of questions need to be addressed by the researcher; what population is to be covered; terminology, respondents, response rate, how to analyse the data, how reliable is the data, measurement scale and pilot testing.

8.6.1 Population

The first question would usually require an analysis of sampling methods that ensure the sample population is random and free from bias. However this research did not sample the population, but rather sent the questionnaire to the whole population as the population size was relatively small (93 universities x 3 questionnaires).

8.6.2 Terminology

The terminology used within the questionnaire needed detailed thought and clarification. The questionnaire sought to identify the degree of change that individual universities had encountered and how accounting systems had also changed. To do this questions were asked, for example, about the degree of dynamism, heterogeneity and hostility that universities experienced. Clearly asking questions that used such terms directly and without explanation would not provide a sound basis for analysis as the meanings of the terms would be interpreted differently by different people and thus potentially affect the response rate (Oppenheim, 1992; Fowler, 1993). This was a departure from the methodology used by Gordon and Miller (1976) as their study made reference to archival case study material, which did not exist for this research. Secondly, as the concepts of dynamism, heterogeneity and hostility were difficult to succinctly define, it was decided to evaluate these through a series of questions that measured

different combinations of two or all three (Appendix 8). To ask a question such as 'has the university faced increased hostility?' would probably elicit a requirement to clarify the question, as it is not specific enough.

8.6.3 Respondents

It was necessary to clarify to whom the questionnaires would be sent. The problem arose that the hierarchy of a university was not the same across the sector and so whilst one university may have faculties, schools and departments, an other may have just schools or variations of these. To simplify this, the generic term of 'academic department' was used with an explanation to this effect in the covering letter (Appendix 9a). The questionnaires were sent to named people (where possible) and the details relating to named personnel and appropriate non-business schools/ departments were obtained from the respective websites of the universities as linked from the University of Wolverhampton website.

8.6.4 Response rate

A reasonable response rate was important to ensure that adequate statistical analyses could be performed and the resulting analysis could be generalisable to the university sector. Whatever the response rate it was necessary to be aware of any non-response error or bias. To increase the response rate a follow up letter was sent in the late Summer of 1999 to those institutions that had not returned the questionnaire (Appendix 9b).

8.6.5 Bias

Devising questions that ensure the objectives of the research were met required very careful consideration if confusion, ambiguity or bias was to be avoided. Confusion generally arises through using terms that are not universally understood to mean the same thing. This was evident earlier in the thesis where a small telephone survey was conducted to identify if universities were using, or had used ABC. A number of respondents initially said they had, but on closer investigation, the understanding of what ABC entailed was not consistently held hence leading to biased responses.

Whilst this survey was conducted with people who had experiences and knowledge of the field of investigation, it was still necessary to avoid any confusion with terminology. Through appropriate pilot testing of the questionnaire any confusion concerning ambiguity or phraseology was, as far as possible, removed. It should be noted that this research related to changes over a period of nine years and it was likely that, in some instances, the recipient of the questionnaire would not have been in their position for the early part of the period covered (early 1990s). Furthermore, the individual's recollection of what was happening at that period might not be totally accurate but there was nothing that could be done to alleviate this. Therefore the statistical tests that were applied and the interpretation that ensued had due regard to this.

Ambiguity or confusion could also arise through insufficient attention being given to the question wording, for example, questions that were double barrelled, i.e. requiring one answer to two questions. These were avoided, but this inevitably led to more questions being added to the questionnaire to capture all the changes that had taken place.

The questions were phrased in such a way that enabled them to be analysed at a later date. Therefore the questions were capable of being coding for entry into a statistical analysis package. Asking 'why' questions, or open questions, was not desirable at this stage of the research as the objective was collect data about a phenomenon and through inductive reasoning to understand what had happened. Hence these questions were kept to an absolute minimum.

Bias was further reduced by considering the wording of the questions, i.e. questions were not leading. Not only does the wording of a question lead a respondent to answer a certain way (Cantril, 1944; Payne, 1951) but so also can the tone of the terminology used (Kornhauser, 1946-47). All these points were considered in the design of the questionnaire.

8.6.6 Non-ignorable non-response

One must also be wary of the response rates obtained from the questionnaires. In reality, it is unlikely to be the case that all the questionnaires will be returned. Whilst a 60% or 80% response may be considered excellent, one must consider the balance that had not responded. This non-response could cause the whole research to be biased towards those that had responded, i.e. one must seek to ensure the respondents are representative of the whole population. If a response rate is very low then one must seriously question the validity of the analysis. Not only will the actual number of respondents be low but there would also be a vast gulf of non-respondents. If these non-respondents had replied, the analysis of the data might lead to very different conclusions. Therefore, one must be wary of placing too high a value on the analysis of questionnaires that have

very small response rates. Appendix 10 shows how error, or bias, can originate (Zikmund, 1997) and the areas of potential concern to this research are coloured in yellow. Whilst some of these areas were not within the control of the design and administration of the questionnaire the diagram did provide a useful tick list of potential problem areas.

8.6.7 Analysing the data

The issue of coding was important here as the questionnaires were analysed through the statistical software package SPSS (version 10.0). The use of pre-coded questions could also be beneficial to the respondent as there are a limited number of responses that can be given. Coding does not necessarily take the form of a list of possible answers to a question, however this could be desirable if such a limited list was available. Coding predominantly concerns itself with ensuring that the questions, once worded, elicit a response that can be classified or coded. Questions could provoke a Yes/ No response, or a measurable response from a group of answers.

Some of the specific objectives of this research concerned themselves with the need to identify specific academic departments and university status (old or new). Whilst this was fundamental to the research it was also necessary to consider the confidentiality of respondents. The questionnaires were not given explicit codes to identify the respondent but rather this was dealt with by a stealth coding system. The questionnaires were colour coded: yellow for business related, beige for non-business related and white for general university management and the identification of the university was made upon receipt of the completed questionnaire though a visual inspection of the postage frank

mark. Thus depending on the colour of the questionnaire and postage frank mark the specific respondent was identified.

8.6.8 Reliability

To ensure reliability, one must consider whether the same results occur if the questions were repeated to the same population or sample (Black, 1999). If so, then one can assume it passes the test of reliability. As discussed in Chapter Two, it is important to be comfortable with the fact that attitudes are a frame of mind and these may change over time. Therefore, such reliability may not be as concrete as if one were researching data that were more factual. Validity, however, is a relative term, as one must know what is correct to confirm whether the data that are collected corresponds to the known 'truth'. As the entire population was sampled in this questionnaire then, subject to the response rates of the three different categories of questionnaires being sufficiently high, the results could be assumed to form a state of opinion that could be generalised to the population as a whole. The responses were based upon the judgement of those filling in the questionnaire and whilst there was no scientific basis to support the answers, the interpretation of the statistical findings was mindful of this fact.

8.6.9 Measurement scale

Many of the questions measured the degree of change in relation to a number of factors and it was important that due consideration was given to an appropriate scale. In this instance, a Likert scale was used. A Likert scale is an ordinal scale ranging over five points, usually seeking opinion on statements from strong agreement through to strong disagreement. Respondents were asked to choose between several response categories where they could indicate their degree of agreement or disagreement. Moser and Kalton

(1979) put forward some guidelines for use in devising statements for use with Likert scales and these were duly considered: -

1. Since the aim of the questionnaire was to spread the respondents over the five response categories there was little point in asking extreme questions that would result in nearly all the respondents answering in the same way.
2. Evidence shows that neutral items do not work well in Likert scales, i.e. statements that on average may elicit a response of neither disagree or agree do not provide any workable results and should be avoided if possible.

8.6.10 Pilot testing

Having considered how the questions should be devised, there was a further vital stage to go through before administering the questionnaire. Questions could not be created without a great deal of knowledge of the subject area, an idea of how the respondents might react to the questions and, paradoxically, even the answers they were likely to provide. All this information ensured a high quality and robust questionnaire, yet this could not be achieved without thorough piloting.

Piloting includes the form of questions, the analysis of expected results as well as consideration of resources required to fulfil the objectives. Ensuring the questions were phrased correctly and statements were understandable can be tested with friends and colleagues. However, pilot testing the questionnaires on a small sample of the population would provided insights that could not be gained via colleagues. As the questionnaire had taken some time and diligence to develop there were little issues that arose during the pilot testing stage.

The question generation and refocusing stage of this research was very rigorous to ensure that the questions were clear; they related to the contingent variables; they were not ambiguous; were capable of being answered and more importantly they could be analysed in relation to the hypotheses that had been developed. The pilot testing stage confirmed this to be the case and also provided an indication of the time it might take to complete; between 15 and 25 minutes.

The completion time of the questionnaire was important as the questionnaire was up to nine pages long and was therefore longer than the general recommendation of a maximum of six pages (Bean and Roszkowski, 1995). However, this can only be a general guide, as the visual layout of the questionnaire will also impact upon the length of it. A closely packed questionnaire may be more difficult to read than one that is more spacious. Whilst the questionnaire used in this research did exceed the recommended number of pages, the layout and structure was designed so as to make the process of completion straightforward. It was designed in a convenient-to-use and logical manner and was not overly complex. Whilst there are guidelines that can be considered 'it is fair to say that question design is the survey director's most persistent headache, particularly since it is still so largely a matter of art rather than science'. (Moser and Kalton, 1979, pp.308)

8.7 Conclusion

This chapter has provided a review of the methodological issues that were pertinent to the second stage of this research using a questionnaire research instrument. It has also described in some detail the rationale behind the development of the questions that form

the questionnaire and more importantly has explicitly stated the specific research objectives.

The next chapter discusses the precise statistical techniques that were used to analyse the data. Whilst Factor Analysis is a well-known technique that is appropriate for this type of study, a new angle of interpretation is provided through Multi-Dimensional Scaling Analysis. Therefore a separate chapter is devoted to this statistical technique to demonstrate the role it has to play within this research.

CHAPTER NINE

The Statistical Analysis Methodology

The previous chapter gave details of the questionnaire methodology and alluded to the statistical analysis that would be undertaken on the data that was collected. This chapter will now provide the rationale for the data analysis and detail the specific techniques that were used to analyse the questionnaire.

From the number of questions in the questionnaire it was obvious that there would be a large amount of data to analyse and this would prove to be challenging given the complexity of the contingent literature and the expectation that different universities/ departments would have reacted differently over the period of the study. Nonetheless, some basic analysis would be straightforward to perform and would provide a starting point to understanding the data. Moreover, a side objective was to see what universities had been doing regarding the issues discussed in Chapter Six relating to the debate on school and course costing. The basic analysis refers to frequency distribution and chi-squared cross tabulation analysis. It is not intended to describe the nature of frequency analysis in this thesis as this can be obtained from any introductory statistical text, however the cross tabulation technique will be described in context before progressing to the more rigorous statistical techniques that were used.

9.1 Cross tabulation analysis

As the questionnaires for the two academic departments were identical then a frequency analysis of each individual department (or combinations of the two) would, it was

hoped, be interesting in itself. Furthermore, this could also be performed on the new/ old university groupings. The chi-squared test, in cross tabulation analysis, would identify whether there were any statistically significant differences between the two academic departments or new/ old university groups. Whilst this alone would not answer the specific objectives of this section of the research, it would nonetheless provide some evidence of differences between the two types of academic departments/ universities.

The data from the questionnaires were entered into a single SPSS file and the academic department/ university group, formed the dependent variable and the common questions formed the independent variables. A review of the frequency and chi-squared cross tabulation analysis is provided in Chapter Ten.

Whilst the above analysis provides a starting point for interpreting the questionnaire data, it was not an appropriate technique to understand the predominant themes that were embedded within the data. These themes needed to be teased out so that an understanding of the evolution of accounting systems and the association of the contingent variables could be understood. Therefore Factor Analysis was initially used to draw out these main themes in the data.

9.2 Factor Analysis

Factor Analysis is a data reduction technique that aims to represent a series of variables in a fewer number of hypothesised variables (Kim and Mueller, 1978). For example, the questionnaire that was used in the business and non-business schools comprised of up to 172 variables for each respondent (academic department questionnaire). Clearly an

attempt to interpret this data in any meaningful way across the respondents would generate a substantial matrix of correlation co-efficients[34]. This correlation matrix would show correlations (both positive and negative) between each of the variables.

The design of the questionnaire created a number of general questions, as described in Chapter Eight, with sub questions within these categories. This was necessary to build up a picture of, for example, how hostility within the external environment had impacted upon individual departments. Through analysing a correlation matrix it may be possible to identify strong relationships within these sub-categories, however the size of such a matrix could result in, to use an old adage, not being able to see the wood for the trees. The data in such a matrix would include many correlations that were not significant and this would result in attention being focussed on non-relevant material.

Factor Analysis is used to see whether correlations that are within a data set can be reduced to a smaller number of theoretical terms that capture the essence of the relationship (Kim and Mueller, 1978). Thus, any non-relevant material is subsumed within the data and the predominant themes, which explain the relationships within the data, come to the forefront. This approach condenses the data and leaves the researcher with a set of variables that needs to be interpreted. Throughout this thesis, the approach that has been adopted is to induct reasoning from the data, be that qualitative or quantitative and, thus, the use of Factor Analysis is entirely consistent with this approach. Given that this research was seeking to identify and understand how contingent variables impacted upon accounting systems evolution in the UK university

[34] A correlation co-efficient matrix analyses the degree of correlation of each variable with each other. Statistically significant correlations are identified within the matrix but with 172 variables there would be a very large matrix (172x172)

sector, then these themes should be allowed to emerge from the data and Factor Analysis would facilitate that.

Factor Analysis provides a mechanism for explaining the data and as such provides a ranking of the more important sets of variables that explain any relationships in the data. This ranking is based on the amount of explanation, or hypothesis, expressed in percentage terms that each set of statistically relevant variables provide of the whole dataset.

It would not be worthwhile identifying every hypothesis to explain all of the relationships, as the incremental hypothesis would only add a small percentage of explanation. Thus, it is necessary to consider the incremental benefit of adding a further hypothesis where the incremental explanation gained by this was low in percentage terms. To explain 100% of the data would require 100% of the original variables. As factor analysis aims to reduce the number of variables then one must expect less than 100% explanation.

What Factor Analysis does do though is identify how many of a smaller number of hypotheses explain a certain percentage of the relationships in the data. The number of reduced variables, and the degree to which they explain the relationships within the data, is most commonly identified through a rule known as either the Kaiser or eigenvalue criterion. An eigenvalue greater than or equal to one is used as a default value to determine the important factors within SPSS, although the Jolliffe (1972) criteria suggests that a value of 0.8 is more appropriate because setting a value of one may be 'throwing away too much information'. Therefore, within this research an

eigenvalue of 0.8 was used as the cut off point (see Appendix 11 for a brief overview of Eigenvalues).

Within the questionnaire data there were a number of relationships that were worthy of investigation and Factor Analysis (using the Principle Components Extraction method) was used to understand the preliminary relationships within the data.

9.3 Factor Analysis as applied to specific sections of the questionnaires

9.3.1 External environment - Analysis 1a

The research strategy has firmly placed the work of Gordon and Miller (1976) as a central theme within this research and the questionnaire was partly designed with their work in mind. One of the aims of this research was to test the view put forward by Gordon and Miller of how accounting systems form, by applying it to the university sector. Whilst the general principle of Gordon and Miller's work has been applied, there were specific issues relating to the measurability of key elements of their work that caused some difficulties in this research. Most notably these related to the inter-relationships between dynamism, hostility and heterogeneity and also the difficulty of asking questions that related to just one of these variables (Appendix 8 refers).

It was suggested with Gordon and Miller's work that the evolution of accounting systems were affected by the degree of dynamism, hostility and heterogeneity that was present within the external environment. To that end, Factor Analysis was applied to question numbers one through to six inclusive (Q1-Q6), which measured changes within the external environment to identify the predominant themes within that data.

Factor Analysis requires data to be on a consistent scale (for example, the Likert Scale) and for there to be a complete set of data (i.e. none missing). The questions within this section (Q1-Q6) were not exclusively on the same scale and there was some missing data, which had to be estimated. Thus, only those questions on the Likert Scale were used to formulate the Factor Analysis and a full discussion of the general approach that was adopted to estimate the missing data is given in Appendix 12.

Whilst Factor Analysis will reduce the variables that explain the majority of the relationships within the data, it will not identify whether there are similarities or differences between the academic departments/ universities within the data set. To help understand this, Factor Analysis was undertaken on the data relating to the business departments/ non-business departments separately as well as on the new/ old universities separately, to see if there were differences in the Factors that emerged. This approach was adopted for this, and the subsequent, analyses as explained below.

9.3.2 Broader contingent variables - Analysis 2a

Whilst the work of Gordon and Miller provided a hypothesis around the development of accounting systems, the questions that were used in the questionnaire cover a broader range of contingent variables (Q1-Q18, Appendix 5). This was because Gordon and Miller concentrated on the external environmental element and the contingent literature identified other areas as being important. Therefore, the Factor Analysis was broadened to include the external environment and other contingent variables that had been measured with the questionnaire to identify which of these became predominant themes in this analysis and, thus, could further help to understand the evolution of accounting systems in UK universities.

9.3.3 Broader contingent variables (general university management) - Analysis 3a

Finally the general university management questionnaire was also analysed using Factor Analysis but this was conducted in isolation (i.e. not combined with the academic department questionnaire). This was because some of the specific questions in this questionnaire were not included in the academic department questionnaire: to include these questionnaires would have resulted in the whole case being eliminated from the analysis where there was one element of missing data.

The purpose of this Factor Analysis was to see if similarities or differences appeared in the reported evolutionary process when compared to the academic department questionnaire. The contingent literature suggests that there is no universal accounting system for all organisations, and this analysis of the data may provide some insights into the different evolutionary processes that emerge when analysing it at the organisational level and also at the sub-unit level within the organisation.

9.4 Multi-Dimensional Scaling (MDS)

The final section on the statistical tests used within this research refers to MDS and this is explained in some depth as it is a technique that has not, as far as the author is aware, previously been used in relation to Contingency Theory. The rationale for this approach is given first, as it is a departure from the approach taken by Gordon and Miller and others (most recently Reid and Smith, 2000) who have used cluster analysis in relation to Contingency Theory.

9.4.1 The rationale

Throughout this research the notion of inductiveness has been paramount. A feature implicit in cluster analysis is that clusters form and, with regard to the above-mentioned studies, they form to show three archetypes; the adaptive firm, the running blind firm and the stagnant bureaucratic firm. These three clusters may not form in the university sector, or there may be more or less than three clusters. Therefore, to use cluster analysis presupposes that there are clusters of universities within this research that relate to ones prior expectations. This is a presupposition that does not fit comfortably within the paradigm that this research was undertaken, therefore the MDS approach was adopted.

MDS is used to visualise the hidden structure of data and, given that it is hypothesised that academic departments or universities have experienced some common configurations of change which has resulted in some common accounting system development, it will be possible to identify the structure of these configurations and interpret them through MDS. In effect, MDS facilitates the opening up of these structures. To that end, this research worked in multiple dimensional analyses so as much inductive reasoning as possible could take place.

9.4.2 The MDS approach

The basic concept behind MDS is best explained by way of a simple example. 'Suppose you are given a map showing the locations of several cities and are asked to construct a table of distances between these cities. It is a simple matter to fill in any entry in the table by measuring the distance between cities with a ruler, and converting the ruler

distance into the real distance by using the scale of the map. Now consider the reverse problem, where you are given the table of distances between the cities, and are asked to produce the map. Geometric procedures are available for this purpose, but considerably more effort would be required' (Krusal and Wish, 1978, pp.7).

MDS is a technique that is used to solve a reverse problem such as this, however the application of the technique to the university questionnaire, as outlined in Chapter Eight, is more complicated than this simple example would suggest. Specifically, the questionnaire posed a number of questions, some of which would inevitably be shown, through Factor Analysis, to be more important than others. Once the 'noise' of non-relevant information has been dealt with, there is still the problem of knowing in how many dimensions the map should be drawn. This is an important step in the modelling process and there are various rules that guide this choice. One could rely on the 'elbow test' (Kruskal, 1964), or on the results of the Principle Components Analysis, from Factor Analysis (Cinca *et al*, 1999), although this is subject to a maximum of six dimensional analyses by SPSS. One may also select a level of dimensions for which an acceptable level of goodness of fit has been demonstrated, though the stress level[35] (Coxon, 1992). This research applied the Cinca *et al* (1999) approach.

MDS creates a map of proximities, which is drawn from how similar, or different, two objects are (in this research the objects were universities). The proximity map is drawn by reference to a number of variables, i.e. question responses, from within the questionnaire. To achieve this the questions must all have the same measurement scale, e.g. all be based on the Likert scale. If two universities answered all the questions in

much same way then the measure of similarity would be high and they would be plotted next to each other, and those with a low value would be plotted far apart (Mar-Molinero, 1990)

The problem with creating a map such as this from a questionnaire database is that it is almost impossible to visualise the final configuration of the map as there are many variables and the map of proximities, in this research, was drawn in several dimensions. Therefore, different configurations of two-dimensional maps are drawn to display the resulting data.

This map of similarities is redrawn iteratively by a computer model until the distances that each case is from one another, in various dimensions, results in an acceptable stress value (see below); the higher the stress value, the worse the configuration that has been drawn.

9.4.3 Stress value

It is unlikely that the first time an n-dimensional map of proximities is drawn by a computer model that it will represent the objects (universities) in the most accurate form. Therefore, a comparison of the **distances** between each object in the n-dimensional map is compared with the values that were given to the objects when the **similarities** were first calculated.

The calculation that is performed is the square root of the sum of the squared differences (between the **similarity** and **distance** matrices) divided by the sum of the

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[35] See section 9.4.3 below for a discussion of the stress value.

squared distances. This is much the same as the least squared method of linear regression and this calculates a stress value in MDS.

The map is then redrawn by the computer model with the aim of achieving a greater goodness of fit. This iterative process of redrawing the map and recalculating the stress value continues until the stress value falls to an acceptable level (default of 0.05 within SPSS), or the improvement in the stress value is below a certain value (default 0.001 within SPSS).

9.4.4 Interpretation of MDS

The n-dimensional maps that emerge from MDS are portrayed as different configurations of two-dimensional maps to aid clarity in the interpretation. The maps, however, will only show the position of the universities in these two dimensions and visual inspection of these graphs (or plots) would not provide a substantial amount of information as regards the change in accounting systems within the university sector, or the way in which contingent variables were associated with them.

Remember that the MDS had been performed with questions that had the same measurement scale (i.e. Likert scale) and therefore will have excluded a range of questions within the questionnaire, i.e. those that had a binary response category (Yes or No). The Likert scale questions related almost exclusively to measurement of the contingent variables, whereas the binary scale questions related to the change in the accounting systems of universities[36] (Appendix 13). Additionally the category of

[36] Many of the binary responses in the latter section of the questionnaire asked questions relating to the accounting system in the early 1990s and then in 1999. This did not capture the change over the period, so the data was manually reviewed to identify when change had occurred.

academic department and the status of the university (old or new) were classified as binary variables and therefore had to be accommodated within the analysis.

If it is suspected that a particular characteristic (contingent variable or accounting system change) may explain the position of the university in the map, then regression based techniques can be used to identify this. The characteristic is taken as the dependent variable in the regression model, with the co-ordinates of the MDS map (in the n-dimensional space) as the independent variables. Property Fitting, or ProFit Analysis (Schiffman *et al*, 1981), was used as the regression tool for characteristics that had been measured on a Likert scale and Logit Analysis (Agresti, 1990) was used for characteristics that had been measured on a binary scale. Thus, every question within the questionnaire was individually considered as a dependent variable and those which were statistically significant at the 0.1 level or higher were represented in the various two dimensional maps. The results of the regression analysis provided a co-ordinate position of the dependant variable (the Beta value), which could be represented graphically by a vector through the centre of the configuration (Schiffman *et al*, 1981; Cinca *et al*, 1999). The projection length of a vector, as measured from the origin to the co-ordinate point at which it is plotted, is important as the longer this is, the greater is the explanation provided by it.

Thus, the MDS n-dimensional maps were drawn with due regard to the degree of change that the universities had experienced in the contingent variables (as described in Chapter Seven), and the association of these with accounting systems changes could be visualised.

The various analyses of the questionnaire data that were undertaken through MDS are outlined below. Following this, one of the two dimensional graphs from Chapter Eleven will be used to explain the way in which the MDS map is interpreted. It is hoped that this will provide a greater understanding of the technique in relation to the more abstract account that is given thusfar.

9.4.5 MDS application to the research

A number of multi-dimensional analyses on the data were proposed. These are stated here and then a more rigorous discussion on each takes place. They were:-

1. **Analysis 1b:** Perform MDS on the external environmental questions (Q1-Q6) for both the academic department questionnaires and perform ProFit and Logit regression analysis of all variables into the MDS output.
2. **Analysis 2b:** Perform MDS on all the contingent variables (Q1-Q18) for both the academic department questionnaires and perform ProFit and Logit regression analysis of all variables into the MDS output.
3. **Analysis 3b:** Perform MDS on all the contingent variables (Q2-Q14[37]) for the general university management questionnaire and perform ProFit and Logit regression analysis of all variables into the MDS output.

As can be seen, these three statements, intentionally, cover the same areas as the Factor Analysis. The MDS approach would enable greater insights, but the Factor Analysis contributed to the understanding of the predominant themes of the data.

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[37] Whilst the numbering of the general university management questionnaire is different to the academic department, the question numbers Q2-Q14 cover the same broad areas as those of the academic department questionnaire (Q1-Q19).

9.4.5.1 External environment - Analysis 1b

This analysis concentrated on using the research findings from Gordon and Miller; those being that dynamism, heterogeneity and hostility all affected the development of accounting systems. Notwithstanding the limitation of this statement, i.e. obtaining data relating to these individual elements was not possible, the MDS approach identified whether combinations of these were found in the same dimension as changes in accounting systems, those being:

- As dynamism and heterogeneity increased the accounting system incorporated more non-financial data, more forecasts and more frequent reporting.
- As hostility increased the sophistication of the accounting system increased.

Once the MDS had been performed, every variable was regressed into this output to identify what the significant variables were (at the 0.1 significance level) in each dimension, or combinations of them. If dynamism and heterogeneity are paired together, as suggested by the Gordon and Miller research, then accounting system changes should also appear that correspond to the points above. Likewise, accounting system changes should appear in association with hostility.

9.4.5.2 Broader contingent variables - Analysis 2b

The Contingency Theory literature suggests that accounting systems are not the same for every organisation and this research contested that such system development was different even within organisations. Within the questionnaire there was a significant amount of data that related to change within the university sector. Rather than test a hypothesis that, for example, external environmental factors impacted upon the

development of accounting systems, this analysis put the complete contingency theory to the test.

Through the use of MDS, the dimensional map and resulting regression analysis identified those significant factors (at the 0.1 level) that emerged together with changes in accounting systems. Such rigorous testing of the questionnaire data would either provide empirical support for the contingency literature or would raise further questions about the applicability of the theory to the university sector.

9.4.5.3 Broader contingent variables (general university management) - Analysis 3b

The final analysis related to the general university management questionnaire and provided a macro view of the university sector and accounting system development. This analysis put the complete series of contingent questions to the test (as analysis 2b), to identify those that were statistically significant (at the 0.1 level) and were associated with accounting system changes. If academic departments had experienced change in the same way as the general university then there would not be any significant difference between analysis 2b and this analysis. If there were substantial differences then this would need to be explored.

9.4.6 Example of MDS Interpretation

The two dimensional MDS map in Appendix 14 is taken from Chapter Eleven. The analysis in Chapter Eleven concerned itself with the external environmental variables as per the Gordon and Miller (1976) study. Each of the external environmental variables had been regressed using ProFit Analysis and the accounting system changes had been

regressed using Logit Analysis. The universities are shown in blue, the statistically significant external environmental variables in pink and the statistically significant accounting system changes in red. The green highlighted area confirms the significance of the academic department, but this is not considered in this specific example of interpretation.

The positions of the universities in the map do not provide a great deal of information in themselves. Furthermore, the scale on the map is not important and this is used solely to provide a co-ordinate position of the university or dependent variable. The position of an individual dependent variable in relation to the origin is, however important, as this will provide the direction and length of the vector and hence the degree of association and importance. The actual vectors have not been drawn for the dependent variables as this would lead to a confusing myriad of lines. Rather, it is important to see the direction of the dependent variables in relation to the origin and interpret these. Therefore, the supposition of the vector lines is left for the reader to visualise.

By way of an example of interpretation, one can consider the horizontal axis. A cluster of external environmental variables and two accounting system changes have been highlighted (circled in Appendix 14) which are all projecting from the origin to the west. Table 9.1 identifies the specific questions from the questionnaire, which were statistically significant, and are therefore represented on the map. The direction of the vector for these dependent variables would, broadly speaking, project along the westerly direction of the horizontal axis. Here it can be stated that universities that are in the direction of the vector, had a greater probability of experiencing the changes as identified by the dependent variables (external environment change and accounting

system changes). Conversely, universities that are in the opposite direction of the vector, i.e. in the east, have a much less probability of having experienced these changes.

Table 9.1: Explanatory variables in the Westerly projection of Dimension 1 and 2 (MDS Q1-Q6)

Westerly projection in Appendix 14
Q3i Entry details in terms of 'A' Level points for u/g
Q4i Financial incentives offered to students to study on u/g courses
Q4ii Financial incentives offered to students to study on p/g courses
Q5i Change of range of u/g courses
Q5ii Change of range of p/g courses
Q5iv Change of range of electives on u/g courses
Q5v Change of range of electives on p/g courses
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research
Q20bi-c AIS Change: Staff budgets (pay) in existence at academic dept level

The dependent variables in the westerly direction relate predominantly to changes in the range of courses at all levels, and the attraction of students to study. It is argued that such changes in the course portfolio emerged as a result of the increasing hostility in the external environment, and it appears that there is evidence of an association with this and accounting system devolution. This devolution is evidenced through change in the existence of staff pay budgets at the academic department level, which is arguably a significant area of cost for a university and therefore a good measure of accounting devolution.

The conclusions to be drawn from this single avenue of analysis are not absolute. If similar themes emerge, however, in different dimensional analyses, then the interpretation that unfolds will gain greater weight.

This example has only considered dimension one and dimension two of an MDS analysis. However, these are the most important dimensions. Just as with Factor Analysis, the first two dimensions of MDS will explain the greatest amount of the relationship in the data. The actual amount of this explanation in the first two dimensions is roughly the same as the value of the first two factors in Factor Analysis (Chatfield and Collins, 1980).

9.5 Conclusion

This chapter has described the statistical techniques that will be used to evaluate the evolution of accounting systems within the UK university sector. Through Factor Analysis and MDS the Contingency Theory will be rigorously tested and the resulting associations will be interpreted.

A number of specific analyses have been identified that were conducted on the questionnaire data and Chapters Eleven through to Thirteen inclusive will consider each of these tests using Factor Analysis and MDS. Chapter Eleven will consider analysis 1a and 1b, Chapter Twelve analysis 2a and 2b and finally Chapter Thirteen will consider analysis 3a and 3b. Before that, however, the next chapter will overview the results of the questionnaires through the use of frequency and chi-squared cross tabulation analysis. Whilst this will not specifically address the application of Contingency Theory to the UK university sector, it will identify any similarities or differences between

universities (new/ old) and academic departments (business/ non-business). Furthermore it will also portray the general direction in which the sector has moved during the period of the study (early 1990s to 1999). This should provide a general insight into the developments, *inter alia*, of school and course costing systems within the UK university sector over that decade.

CHAPTER TEN

Preliminary Frequency and Cross Tabulation Analysis

This chapter provides details of the responses to the questionnaire as analysed through frequency and chi-squared cross tabulation analysis. The objective is to provide general themes and highlight the more interesting observations that emerge.

Initially the chapter addresses the more significant features of the data, particularly where there has been substantial change, or where a specific practice appears to dominate, including some insights into the issues that were raised in Chapter Six concerning the developments of course/ activity costing. The analysis then will focus on the significant differences between the new and old university sector before addressing the differences between the business and non-business departments.

10.1 Response rates

Of the 279 questionnaires that were originally sent (three to each of the 93 universities), a total of 82 were returned after a follow up letter had been sent. This represented 29.4% of the population. Table 10.1 shows the distribution between the three questionnaires.

Table 10.1: Distribution of responses of questionnaires

Questionnaire category	Number of questionnaires returned	Percentage returned
Business departments	31	37.8%
Non-business departments	21	25.6%
General university management	30	36.6%
Total	82	100.0%

Complete frequencies of all the responses provided by each of the questionnaires are shown in Appendices 15, 16 and 17. Appendix 15 provides details of the business department, Appendix 16 the non-business department and Appendix 17 the general university management. These are the actual questionnaires with total numerical frequency entered into each response box.

The interpretation that follows combines the business and non-business departments responses, as the questionnaires for these two categories were identical. Where appropriate, the general university management questionnaire has also be incorporated into this analysis as many of the questions were common to all three questionnaires.

10.2 Data recoding

In order to perform the chi-squared test, and thus identify any statistically significant differences there needs to be adequate data in each of the response categories (i.e. in each cell on the 5 point Likert Scale). Due to the response rate, some cells contained very low counts and the chi-squared test was not valid. Therefore, some recoding of the data had to take place and therefore the original 5 points were condensed into the 3 grades as shown in Table 10.2.

Table 10.2: Re-graded scale for chi-squared analysis

Original Likert scale point	Re-graded point for Chi-squared analysis
1	1
2	1
3	3
4	5
5	5

The interpretation that follows below will also use this condensed grading structure, as opposed to the original 5 point scale, for uniformity.

10.3 General interpretation

Each of the questions are referenced in shortened format in the following Tables to aid presentation, however the shortened code together with full question wording can be referred to in full in Appendix 18.

10.3.1 External environment (Q1-Q6)

The general impression given by a range of questions in this section (see Table 10.3 and Table 10.4) was that there had been a substantial amount of change as regards the teaching and research requirements of universities during the 1990s. The questions in this section, whilst addressing the teaching and research changes in the university, were also collecting data on the external environment (as per Gordon and Miller, 1976). The specific areas of the external environment that each question collected data upon are shown in Appendix 8.

Table 10.3: Change in delivery of courses (Q1) and use of IT (Q2)

Question	Little or no change	Moderate change	Significant or dramatic change
1(i)	8	18	26
1(ii)	12	17	20
2(i)	1	2	49
2(ii)	0	10	38

The data shows that all courses have experienced change over the past decade. This, in itself, is not surprising, as change would be expected as the requirements of stakeholders alter over time, and courses are subject to timely reviews. Notwithstanding this, there has been a significant amount of change of these courses across the board, and this would suggest that the marketplace has become more hostile as universities attempt to attract good students onto their courses.

Table 10.4: Change in range of courses (Q5) and range of staff involved in research and institutional demand thereof (Q6)

Question	Significant or moderate decrease	No change	Moderate or significant increase
Q5(i)	5	9	67
Q5(ii)	4	7	69
Q5(iii)	2	16	56
Q5(iv)	8	14	56
Q5(v)	2	16	56
Q6(i)	4	17	60
Q6(ii)	4	13	64
Q6(iv)	0	19	62

The responses to the questions in Table 10.4 indicate that, as expected, there had been a general and significant change in the external environment in which universities were operating. This change in the external environment has led many universities to increase the range of courses on offer (product invention), change the way in which they have delivered their courses (process invention), and led to a competitive market place for academic staff, especially those that were research active and thus could attract research funding/ income and publish their work.

The changes in the external environment were also measured through questions that related to students (Q3, Q4 and Q6iii – see Table 10.5). The responses to these questions were not as skewed towards the significant change, as those in Table 10.3 and 10.4, although there was still evidence of change as shown by the spread of responses on either side of the 'no change' variable.

Table 10.5: Change in student related areas (Q3, Q4 and Q6iii)

Question	Significant or moderate decrease	No change	Moderate or significant increase
Q3(i)	13	16	21
Q3(ii)a	6	27	17
Q3(ii)b	3	38	7
Q3(iii)a	12	30	7
Q3(iii)b	1	22	22
Q3(iv)a	16	11	24
Q3(iv)b	6	17	27
Q4(i)	11	30	7
Q4(ii)	7	32	8
Q6(iii)a	0	42	7
Q6(iii)b	3	12	35
Q6(iii)c	2	29	17

It is worthwhile pausing to consider some of the responses in Table 10.5. Q3(i) concerned itself with changes to the A level points for undergraduate students. Here, there are clearly some university departments that have changed their requirements with a decrease in A level points, perhaps as a way of attracting students to less popular courses or geographic location. Conversely, other universities have increased the A level points, perhaps as a way of attracting higher calibre students in the face of, ironically, increasing competition. For example, The University of Southampton's School of Management recently increased the A level entry of undergraduate entry from 24 to 26 points solely because the universities which Southampton competed against for students had A level entry requirements of 26 points. Thus, students would rank the

University of Southampton as equal to other universities rather than as an 'insurance' choice in their selections. Therefore, when they obtained the required grades they would elect to come to Southampton rather than a different university, which had, previously, a higher A level point threshold. Whatever the justification for changing the A level entry point criteria, the reason for so doing, would be to attract students because of the increasing competition in the marketplace for them.

Further evidence of increasing competition in the marketplace is found by reference to Q3(iv) (parts a and b). The responses to these questions show that the application rate for places has increased. One measure of how popular a course is within a university is how many times the place is applied for as a ratio of how many places are available. Many universities in the survey reported an increase in the application rate, which could mean, at the university level, that courses are proving more popular, but when taken holistically it is a measure of how many places there are for students as compared to those wishing to attend university. This is a further measure of increased competition in the marketplace.

Finally in this section, there is a marked increase in the number of students registering for research, with 70% (35 out of 50) of universities reporting a moderate to significant increase. The age profile of these students has remained reasonably constant and whilst the financial incentives to study do not explain the large increase in students registering, there must be a rationale for this. The growth in research students is not subject to restriction and in many cases these students can be worthwhile investments for universities. Their research output, and the fact that they are researching at a university, would pay financial dividends for the particular university. It is, therefore, not so

surprising that this is an area that universities have sought to exploit as a further means of coping with the external environmental change.

10.3.2 Broader contingent variables (Q7 – Q18)

10.3.2.1 Market research activities

The responses to the questions in this section are analysed according to the structure of the questionnaire, i.e. under the headings of 'market research' and 'operating authority'. The initial section, market research, was included in the questionnaire as it was hypothesised, in Chapter Seven, that universities could be likened to stagnant bureaucratic organisations where 'decision making occurs without adequate analysis'. This, it was suggested, was the position before the binary divide was removed and it was argued that universities needed to undertake a number of tasks to create a more effective accounting system; the collection of market orientated data being one of them.

Table 10.6 clearly shows that there has been an increase in the collection of market-orientated data. It is, perhaps, not so surprising to see that the amount of internal market research, as measured by question 8i, 8ii and 8iii has seen the greatest increase. Course evaluation questionnaires are very much commonplace now, as listening to, and taking action upon, the student viewpoint is considered an important step in the quality assurance mechanism.

Table 10.6: Formal developmental and internal market research

Question	Significant/ moderate decrease	No change	Moderate/ significant increase
Q7(i)	0	32	43
Q7(ii)	0	31	43
Q7(iii)	0	24	53
Q7(iv)	0	25	52
Q8(i)	0	7	70
Q8(ii)	0	10	62
Q8(iii)	0	15	60

Whilst the broad sweep of market research in relation to course development (Q7i and Q7ii) has expanded, the pace of change has not been so rapid when compared to the internal market research. It would appear that many universities are content to evaluate the views of students that are already at university (Q8i, 8ii and 8iii), but less are prepared to undertake more proactive market research through the wider stakeholder groups (Q7i and Q7ii). Similarly, there is a group of universities that has not increased the investment in market research for 'research funding' (Q7iii) or 'other sources of external income' (Q7iv), but this may be a result of the specific aims of the individual university. Notwithstanding this final comment, there has been an overall increase in the amount of general market research being undertaken by universities (see Table 10.7).

The responses in Table 10.7 are, for the most part, self explanatory. Universities have been investing internally to undertake market research (Q9i) and have, to a lesser extent, increased the use of external bodies (Q9ii) to undertake market research on their behalf.

Table 10.7: Investment in marketing (Q9) and evaluation of competition (Q10)

Question	Significant/ moderate decrease	No change	Moderate/ significant increase
Q9(i)	0	6	70
Q9(ii)	2	49	20
Q10(i)	1	34	42
Q10(ii)	2	35	40

The exceptions to this, i.e. two universities reporting a significant/ moderate decrease in the use of external bodies should be highlighted. One of these reported a decrease in the amount of external market research, but reported an increase in internal activity. It would be reasonable to suggest that the transfer of resources, under this circumstance, was to obtain better value for money by the academic department. The other university that reported a reduction in the use of external market research agencies also reported a reduction in the amount of formal evaluation of other universities' course provision (Q10i) and research (Q10ii). It would appear that this specific university had made a conscious decision to reconsider the value being obtained from this activity, which was in contrast to the general viewpoint of the sector.

The analysis of the market research section of the questionnaire has shown that universities have been collecting more non-financial information over the past decade. This may, in part, be to demonstrate that they are listening to, and acting upon, student feedback to satisfy external and internal quality requirements. It may also suggest that the characteristics of the university sector do not align themselves with a stagnant bureaucratic organisation. It would appear that the universities that responded, are not

operating within an insular environment and do have information about what is happening in the external marketplace.

10.3.2.2 Internal operating authority

The second section of the broader contingent variables related to the internal operating authority of the university. The organisational structure was discussed in Chapter Seven as an important contingent area, and the analysis of the responses in this section will provide an insight into the changes that have occurred.

The questions in this section of the questionnaire measured the degree of decentralisation in the early 1990s (about the time that the binary divide was lifted), and also in 1999 (at the time the questionnaire was administered). Changes in the internal operating structure of the university can be interpreted from the movement that takes place between the beginning and end of the decade. Table 10.8, for example, shows the changes that have taken place regarding staffing issues.

Table 10.8: Influence of academic department regarding staffing issues (early 1990s to 1999)

	Early 1990s			1999		
Question	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised
Q13(i)a	32	22	23	19	18	42
Q13(i)b	14	15	48	10	11	58
Q13(ii)	26	25	23	15	19	42
Q13(iii)	38	11	18	29	13	26
Q13(iv)	12	13	38	10	5	50
Q16(vi)	39	19	19	29	18	32

The initial impression given by the responses in Table 10.8 is that there has been a general shift towards greater devolution of power relating to staffing issues over the last decade, although clearly, there are many universities that retain decision making at the centre. Given that staff costs are the greatest costs that will be incurred within an academic department, the devolution of operating authority, as measured by the appointment of staff, is a significant step. One may assume that the devolution of operating authority such as this would require a devolved accounting system, so that decisions are made with full regard to the financial consequences. It is interesting to note that whilst Table 10.8 shows that has been a general shift in devolution, there are also many universities that had such devolved power in the early 1990s. Given this is the case, one might expected that those universities would already have developed accounting systems to cope with this devolution of operating authority and potentially expenditure.

Further questions in this section of the questionnaire, addressed other areas of decision-making, notably authorisation to develop and implement new courses and the degree of devolution as regards approval for expenditure. Table 10.9 shows the changes that had taken place.

The three shaded questions (Q14i, Q14ii and Q16iv) in Table 10.9 concerned themselves with substantial expenditure items, such as IT and captured the degree of devolution that existed regarding significant, non-staff, expenditure. The picture that unfolded was very similar to that of staff costs where there had been a gradual shift towards decentralisation, yet many universities were maintaining central decision-making.

Table 10.9: Further changes in internal operating authority

	Early 1990s			1999		
Question	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised
Q14(i)	24	21	31	13	21	43
Q14(ii)	32	24	19	22	21	33
Q15(i)	34	21	24	31	13	36
Q15(ii)	34	22	23	30	13	37
Q15(iii)	18	22	35	18	11	47
Q16(i)	9	11	57	7	4	67
Q16(ii)	12	14	52	10	9	58
Q16(iii)	17	18	37	9	8	56
Q16(iv)	26	19	30	15	15	48
Q16(v)	10	11	56	6	3	69

The analysis of questions 15i, 15ii and 15iii, however, might suggest that the movement occurred from shared responsibility to further decentralisation and those universities that had a centralised decision making did not devolve further. Finally, the balance of questions measured by Q16 (the smaller items of expenditure) showed that there was a high degree of decentralisation in the early 1990s and this increased further over the decade.

The overall impression that emerges from Table 10.9 is that devolution of operating authority has not been uniform, and it has been different in relation to different classifications, and importance of costs. Generally, the authority for relatively small items of expenditure (Q16i, Q16ii, Q16iii, Q16v) rested with the academic department and the devolution of this authority has continued. These costs, it could be argued, are relatively straightforward to control at the academic level and may not represent a substantial percentage of the expenditure budget for the university. Therefore, the importance of this decentralisation of authority can be termed low.

As the importance of the operating authority devolution increases, the manner in which this is dealt with differs across the university sector. Approval for higher expenditure, for example IT, has more universities exercising centralised control, although there has been some movement to decentralisation, but not as extensive as small expenditure items.

Furthermore, the degree of authority to develop new courses (Q15i, Q15ii and Q15iii), which could have a knock-on effect within the university, in terms of balance of courses and student numbers, is not consistent. Many universities have not decentralised this

authority, yet there appears to be a number that have moved from shared responsibility to full decentralisation.

The different ways in which the authority for decision-making has manifested itself within the university sector, would surely make any developments in a supporting accounting system, specific to the requirements of the university. Whilst the external environment in which the universities operate is common to them all, the manner in which the internal operations have changed is not consistent across the sector. It is, therefore, difficult to imagine a universal accounting system for the sector as a whole given the different requirements of a decentralised versus centralised structure. The following section, nonetheless, considers the changes that have occurred in accounting systems within the university sector over the past decade.

10.3.3 Accounting system changes (Q19 – end)

The vast majority of responses in this section were measured on a binary scale (yes or no), and many of the questions referred to the characteristics of the accounting system of the university in the early 1990s and again in 1999, to identify if any change had occurred during the time period. The analysis that follows considers the more important changes that have occurred in the financial management of academic departments over the past decade.

10.3.3.1 Financial devolution

The general shift in financial devolution over the past decade is shown in Table 10.10. It is very clear, from these responses, that the academic department's responsibility for meeting financial targets that are set by the university has increased substantially. This

is the first tangible evidence of academic departments being increasingly responsible for financial targets and this would, therefore, beg the question of how these departments are coping with these requirements. In Chapter Six, it was suggested that the university may exercise control by insisting that schools breakeven, and it is therefore the department itself that may require some notion of how its costs change with different course mixes and numbers of students. Evidently, universities are exercising this level of control, and the analysis of the responses from this section of the questionnaire will shed some light on how the academic department (or university) has responded to this challenge.

Table 10.10: Academic departments' degree of responsibility for meeting financial targets set by the university.

	Early 1990s Degree of responsibility			1999 Degree of responsibility		
Question	None / Little	Shared	Significant/ Full	None / Little	Shared	Significant/ Full
Q19	26	22	31	7	17	56

Table 10.11 shows that accounting records detailing expenditure (Q20ii) were well established in the early 1990s, although there appeared to be some difference between items of low importance (non-pay costs – Q20iia) and staff budgets (Q20iib). It would appear, marginally, that staff budgets were less devolved in the early 1990s when compared to the non-pay costs, although the difference appears to have narrowed by 1999.

Whilst accounting records were maintained regarding expenditure in the early 1990s, the appearance of records relating to revenue was not as widespread (Q20i). This would

imply that for a large number of academic departments, any financial control would have been predominantly exercised on the expenditure. Thus costs would have been considered with little reference to the revenue streams. The potential problem associated with over concentration on one aspect of the finances (expenditure or revenue) was only too clear in the University case study in section one of this thesis, where course development strategy was created out of a blinkered view of revenues alone, with severe medium term consequences.

Table 10.11: Financial information at the academic department level

	Early 1990s		1999	
Question	**Yes**	**No**	**Yes**	**No**
Q20(i)	43	35	68	12
Q20(ii)	60	17	77	3
Q20(ii)a	59	13	73	4
Q20(ii)c	43	28	67	9
Q21	23	49	45	31

Table 10.11 further demonstrates the changes in financial devolution that were occurring during the last decade by reference to the allocation of university overhead to the academic department (Q21). Whilst this has increased significantly there appears to be a number of universities that still do not allocate overheads, and it would be reasonable to infer that these academic departments would operate on a marginal, as opposed to absorption, costing system, if they indeed have devolved financial management.

This last point is verified in Table 10.12 where academic departments have identified whether they are more aware of the direct (Q22i) and/ or full (Q22ii) costs that they incur now. As can be seen, a number of academic departments are not any more aware of the full costs they incur now, and one could argue this is a function of the central overheads not being allocated to the department.

Table 10.12: Academic department awareness of direct/ full costs

	More conscious of the costs incurred now	
Question	**Yes**	**No**
Q22(i)	65	6
Q22(ii)	51	22

Tables 10.11 and 10.12 above show the general degree of financial information that was available at the academic department level and whilst this is useful, they only show a general picture of revenue and expenditure. Tables 10.13 and 10.14 below, provide some more detail, particularly whether universities have sub-categorised the revenues and expenditure. Table 10.13, for example shows the extent to which the accounting information is segregated into teaching and research, whereas Table 10.14 provides some information on course/ activity costing.

10.3.3.2 Teaching and research categorisation

Table 10.13 tells an interesting story. The centralised accounting function within the university has provided, and continues to provide, information on the direct costs of teaching (Q24i) and research (Q24ii). The provision of direct cost information was clearly much more popular over the decade, when compared to the provision of information about the full costs of teaching (Q24iii) and research (Q24iv).

Table 10.13: Teaching and Research classification of costs

	Early 1990s		1999	
Question	Yes	No	Yes	No
Q24(i)	32	26	54	21
Q24(ii)	34	25	56	20
Q24(iii)	11	35	34	41
Q24(iv)	13	44	32	43
Q24(v)	28	15	56	6

Furthermore, there appears to have been a substantial increase in the availability of some/ all of this information at the academic department level (Q24v). The fact that this information has become more available at the academic department would suggest that there is a demand for it and thus, in turn for it to be used to inform the decision making process.

10.3.3.3 Course/ activity costing

Table 10.14 is of particular interest given the discussion that took place in Chapter Six concerning the developments, or lack of them, in relation to course/ activity costing.

The three questions that are shaded in Table 10.14 relate to the recording of revenue and expenditure of courses. Within the centralised accounting function there is very little evidence that costs are being allocated to courses (Q27i) and this has not changed a great deal over the past decade. If universities are exercising financial control through the broad academic department position (i.e. breakeven) then it is not surprising that, at the university level, there have been little accounting developments to record costs of

the courses. However, the position as regards research activity is very different (Q27ii). There is an external reporting requirement to funding bodies to show the costs incurred on individual research projects and this has obviously been catered for in the accounting system to date by the majority of universities.

Table 10.14: Activity costing developments

	Early 1990s		1999	
Question	Yes	No	Yes	No
Q27(i)	6	67	12	65
Q27(ii)	41	30	56	20
Q30(i)	12	57	23	52
Q30(ii)	15	52	26	47
Q30(iii)	39	30	56	18
Q30(iv)	37	31	49	22

Turning to the academic department, Table 10.14 clearly shows a difference between what the academic departments perceive as important in accounting terms. Q30iii and Q30iv show that the majority of academic departments have recorded the costs of research and other activities (excluding undergraduate and postgraduate courses) and this has grown over the research period. Contrast this with the position of undergraduate (Q30i) and postgraduate (Q30ii) courses. By far the majority of academic departments do not record the costs and revenues of their undergraduate/ postgraduate courses, yet they do for research and other activities. It would be reasonable to infer from this that the lack of financial recording is because of a lack of will, as opposed to an accounting system that is not capable.

This view should, however, be balanced by a counter argument that interprets the data more liberally. There has been some substantial growth in the number of academic departments recording financial information about their courses. One may infer from this that academic departments, that are now much more aware and responsible for the financial targets that are being set by the university, are starting to cost all their activities within their area of responsibility. The research (Q30iii) and other activities (Q30iv) have, historically, been separately identifiable and therefore keeping financial records of these activities has been more straightforward. The financial position has, however, become more difficult and many academic departments (and universities) should, and are, starting to address the costs and revenues of their courses. Further evidence of universities using course costing has been shown through a small number of high profile course closures by some universities in recent times.

10.3.3.4 Summary

The picture that has emerged from the above analysis of accounting system developments is one of change within the sector, but the change has not been entirely consistent and not always in the same manner. There is evidence of most academic departments being much more responsible for financial targets over the period of the study (Table 10.10), and where there have been more resources allocated to this area the majority of respondents indicated that this had been of a substantial nature (Table 10.15 below). Whilst Table 10.15 shows the significant increases in academic time (Q25) and resources (Q26) that have been allocated to the area of financial management as a direct result of financial devolution, this has to be balanced with the smaller, yet important, number of academic departments/ universities that have not seen any change.

Table 10.15: Financial management in the academic department

Question	Any change?		If Yes, degree of change		
	No	Yes	Moderate/ significant decrease	No change	Moderate significant increase
Q25	17	61	0	0	61
Q26	21	57	1	2	53

The fact that some academic departments have not allocated additional resources and others have could indicate that the way in which financial responsibility has evolved is dichotomous. This is no doubt an over simplification of the evolution process and subsequent, more detailed, analysis in Chapters Eleven to Thirteen will confirm the complex evolutionary process that is associated with the contingent variables.

10.3.3.5 Bottleneck management

Finally in this section, reference is made to the degree of bottleneck management that exists within the academic departments/ universities. In Chapter Six, mention was made of the potential to use the basic principles of the Theory of Constraints (Goldratt and Cox, 1984) to help manage any bottleneck resources that may exist. Table 10.16 shows that many respondents identify that there are bottlenecks that prevent growth (Q32a) and, interestingly, there are a number of respondents that claim that these are being used proactively in teaching (Q32bi) and research (Q32bii) planning. Furthermore, the inference is that teaching and research bottleneck management are seen as equally important to one another, yet as shown in the above analysis, the degree to which accounting information for teaching activities (at the course level) is available is very poor when compared to individual research activities. Given that there is much more

accounting data available within the academic department for the combined teaching and combined research activities (Table 10.13) then perhaps bottleneck management is undertaken at a holistic level within the department. It is difficult to foresee how this is undertaken in practice however, as there is little breakdown of the costs of individual teaching activities (i.e. course costing – Table 10.14).

The general issue of bottleneck management was raised in Chapter Six as a way in which academic departments could respond to the issue of financial devolution. Table 10.16 shows that there has been substantial progress in this area and whilst this thesis cannot add any further insights into how this has evolved it can leave the option open for future research. Notwithstanding this last point, the evolution of an accounting development such as this is important and will be addressed in relation to the contingent literature if and when it appears as significant in the subsequent MDS analysis.

Table 10.16: Identification of Bottlenecks

Question	Number	
Q32ai Staff time	52	
Q32aii Staff availability	36	
Q32aiii Room availability	28	
Q32aiv Timetabling	15	
Q32av Insufficient demand from students	17	
Q32avi Budgetary constraints	41	
	Yes	**No**
Q32bi Teaching plans	47	26
Q32bii Research plans	46	26

10.4 Statistical differences between new and old university sectors.

The above section has provided a detailed analysis of the general changes that have taken place in the external environment, the operating authority and accounting systems of the UK university sector. This section of the analysis will focus on the significant differences between the two sectors of UK universities, i.e. the new and the old university sectors.

In order to identify the significant differences the responses were analysed using the cross tabulation technique using a code to differentiate the questionnaire responses into those from the old universities and those from the new universities. To identify the statistically significant differences, at the 0.1 level, the Pearson Chi-squared test was used and the statistically significant questions are shown in Appendix 19. From all the

responses that were obtained there were 4 universities that could not be classified into new or old university, as the postage frank that was used to identify the specific university was unreadable. These 4 universities were removed from the analysis so that the chi-squared test could be performed more reliably.

Even with the 4 unidentified universities removed from the analysis there were a number of questions that appeared to be statistically significant but some cells still contained very low counts and thus the chi-squared value would not have been valid. The instances where this occurred are still referenced in this section because the differences between the two sectors are still important, however, the degree of difference cannot be shown statistically. The specific instances of statistical significance will be highlighted accordingly (and are shown in Appendix 19).

10.4.1 External environment (Q1-Q6)

There are a number of interesting differences between the two sectors in this area, although none of which are statistically significant. Table 10.17 highlights the questions that will be addressed in this section.

One will recall that the questions that were asked in this section of the questionnaire (Q1-Q6) were measuring elements of the external environment as per the Gordon and Miller (1976) research. Table 10.17 does not indicate that a particular element of the external environment dominates as an explanatory theme, as the specific questions that are highlighted measured different aspects of the external environment.

Table 10.17: Differences between the new and old university sector (external environment)

	New Universities			Old Universities		
Question	Moderate/ significant decrease	No change	Moderate/ significant increase	Moderate/ significant decrease	No change	Moderate/ significant increase
Q4i	9	17	2	2	9	5
Q4ii	6	18	2	1	10	6
Q5i	3	2	38	2	7	25
Q6ii	2	3	37	2	10	23

The differences that appear in Table 10.17 do suggest, however, that the reactions of the two sectors to the changes that were taking place in the external environment have not been consistent. The new university sector appears to have experienced a greater increase in relation to the range of undergraduate courses on offer to students (Q5i) and the proportion of staff actively undertaking research for RAE relevant output (Q6ii) than the old university sector. The old university sector, on the other hand, has increased the financial incentives offered to students to study on undergraduate (Q4i) and postgraduate (Q4ii) courses more so than the new university sector.

The differences that are outlined in the above paragraph suggest that, overall, the external environment has affected the two sectors in broadly the same way, however, there are some small, but nonetheless important areas where differences have occurred. As one considers the contingent literature, especially the work of Gordon and Miller (1976), one can foresee the possibility that the accounting system requirements of the two sectors may be different, however the manner in which the external environment has impacted upon the two sectors may be very similar. Therefore it is questionable as

to whether then external environment has impacted differently enough on the two sectors to be an explanatory factor in the evolution process of the accounting systems.

10.4.2 Broader contingent variables (Q7 – Q18)

There are a number of statistically significant differences between the two sectors in this section of the questionnaire and these will be addressed below. It is interesting to note that the 'market research' (Q7-Q11) activities of the two sectors are generally the same with only one exception, and this exception whilst highlighted is not statistically significant due to the low counts in certain cells. Nonetheless, Table 10.18 identifies the change that has taken place in the formal evaluation of what other universities are doing in similar areas of research activity. It can be seen that the new university sector has increased its activity more so than the old university sector.

Table 10.18: Formal evaluation of other universities research activity

	New Universities			Old Universities		
Question	Moderate/ significant decrease	No change	Moderate/ significant increase	Moderate/ significant decrease	No change	Moderate/ significant increase
Q10ii	2	15	24	0	19	13

The significance of the data in Table 10.18 needs to be combined with the statistically significant differences that have emerged between the two sectors below. These specific areas are addressed in three separate Tables (below) and from these an interpretation will follow which puts meaning to the differences and the potential implications for accounting systems evolution.

10.4.2.1 Operational devolution - staff

The first area of statistical difference is shown in Table 10.19 where the new universities have experienced much more decentralisation of operational authority in relation to the appointment of full time academic staff (Q13ia99) and administrative staff (Q13ii99) by 1999. This is confirmed by the more general question that was asked regarding the appointment of staff (Q16vi99) in 1999. The fact that these three questions do not appear as statistically different in the early 1990s would indicate that the two sectors were not any different at that time. Thus, the new university sector has devolved this area of responsibility much more than the old university sector. Linking this with the data from Table 10.18 (above) and Table 10.20 (below), one can build a picture of much greater devolution of operational authority in the new universities.

Table 10.19: Statistically significant differences between the new and old university sector - Influence over the appointment of staff

	New Universities			Old Universities		
Question	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised
Q13ia.99*	6	8	27	13	9	12
Q13ii.99*	5	8	28	10	9	12
Q16vi.99*	11	9	22	17	9	7

*Significant at the 0.05 level.

10.4.2.2 Operational devolution - courses

Table 10.20 provides further evidence of the much greater operational devolution that has occurred in the new universities compared to the old universities. Once again the

absence of any statistical difference regarding the authority to develop and implement new undergraduate (Q15i90) and postgraduate (Q15ii90) course in the early 1990s would indicate that the degree of devolution, or lack of it, was consistent across the sector. The position in 1999, however, was one of the new university sector having devolved the authority for undergraduate (Q15i99) and postgraduate (Q15ii99) courses much more than the old university sector. Furthermore, Table 10.20 shows that the new universities had (in the early 1990s), and still do have (as of 1999), greater devolved authority to develop and implement other types of course, such as bespoke, short or professional courses.

Table 10.20: Statistically significant differences between the new and old university sector - Authority to develop and implement new courses

	New Universities			Old Universities		
Question	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised
Q15i.99*	9	9	24	21	4	9
Q15ii.99*	9	8	25	20	5	9
Q15iii.90**	5	15	19	11	7	14
Q15iii.99*	4	5	31	13	6	13

* Significant at the 0.05 level. ** Significant at the 0.1 level.

Tables 10.18, 10.19 and 10.20 provide clear evidence of a greater devolution of operational authority, during the last decade, by the new universities when compared to the old universities. The reaction of the new universities in this manner is, however, of particular interest because the external environment in which the whole university

sector was operating, did not impact differently upon the two sectors (in statistically significant terms), yet they have evolved, internally, differently over the same period.

10.4.2.3 Operational devolution – investment/ expenditure

Furthermore, Table 10.21 shows that, in the early 1990s there were differences between the two sectors regarding the degree of authority they had in relation to approving certain items of expenditure, yet this difference was not apparent by 1999.

Table 10.21: Statistically significant differences between the new and old university sector - approval of investment/ expenditure

	New Universities			Old Universities		
Question	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised
Q14i90**	18	8	15	6	9	16
Q16ii90*	11	9	20	1	5	28
Q16iv90*	19	8	12	6	9	17

* Significant at the 0.05 level. ** Significant at the 0.1 level

Table 10.21 shows that the old university academic departments had greater operational authority for investment in IT for academic activities (Q14i90), overseas travel expenditure (Q16ii90) and capital expenditure items (Q16iv90 in the early 1990s when compared to the new universities. The fact that this difference is no longer apparent in 1999 would indicate that the new universities have devolved this authority over the period, to the point where the degree of devolved authority is the same when comparing both sectors.

10.4.3 Summary

The analysis of the new and old university sector raises an important question regarding Contingency Theory. To summarise the results so far, it would appear that the external environment has affected the whole university sector in much the same way, as there were no statistically significant differences found. Furthermore, the internal operating authority has changed differently, with the new universities devolving greater powers in some areas compared to the old universities. There is also some evidence that in the early 1990s the older universities had a greater degree of authority devolved to the academic departments to permit them to approve certain elements of expenditure, but over the period of the study the new universities had 'caught up'. The position of the 'old' universities in the early 1990s could be explained by the findings of the Jarratt Report (1985) which amongst other recommendations suggested that universities (referring to the established universities as of 1985) should delegate budgets 'to appropriate centres which are responsible to the planning and resources committee' (pp. 36). One may argue however, that the evidence from the questionnaire shows that the degree of devolution was not that significant given a period of approximately six years had elapsed between the date of the Jarratt Report and the initial date of this enquiry. It would appear that many recommendations of best practice that had emerged through the PCFC/ HEFC (see for example HEFCE, 1995b) over the years had not been fully implemented within the university sector.

The significance in the way that the two university sectors' operational authority has evolved over the period of the study is important because it would suggest that the internal operations have evolved differently given the same external environmental

changes that have taken place. Thus, it is suggested that changes in the external environment do not drive common changes in the internal operations of universities.

The issue that needs to be addressed now is the extent to which there are differences in the way the accounting systems of these two sectors have evolved over the period of the study.

10.4.4 Accounting system changes (Q19 – end)

There are a number of statistically significant differences between the new and old universities' accounting systems' characteristics and there are a number of interesting differences, which are not statistically significant due to the low number of responses in certain cells. In total there are 16 questions that highlighted differences between the accounting systems of new and old universities, yet only 6 of these are statistically significant. The statistically significant responses will be addressed and discussed.

10.4.4.1 Overhead allocation

Table 10.22 shows that where overheads have been allocated to the academic department, the allocation method has changed more so in the new universities than the old. It should be confirmed at this point that there is no evidence to suggest that either of the sectors are different in allocating overheads to the academic department level. It was confirmed in the general section (Table 10.11, Q21) that there were a number of universities that had not allocated overheads, but the evidence here is that where the allocation of overheads have taken place the instances of the allocation method changing is greater in the new universities (See Appendix 18 for details of questions).

Table 10.22: Statistically significant differences between the new and old university sector - overhead allocation method changed

	New University		Old University	
Question	**Yes**	**No**	**Yes**	**No**
Q21i_c**	19	4	15	10

** Significant at the 0.1 level

The requirement to change could be the result of a number of factors, but it is argued that the more important ones are:

- Either to increase the sophistication of the overhead allocation model, and/ or,
- To remove any perceived inequalities in the current model.

Thus, change may be required as the momentum of financial devolution within the university increases.

10.4.4.2 Accounting systems in the early 1990s

Further differences are evidenced in Table 10.23 where the data suggest that the old university sector's accounting systems had evolved in certain areas by the early 1990s. Table 10.23 shows that the accounting systems of the old university sector were more advanced than the new universities in specific areas. The old university academic departments were recording the costs and revenues of research activity (Q30iv90), other activities, which excluded undergraduate and postgraduate courses (Q30aiv90), and these reports were specific to the needs of the academic department (Q30a90).

Table 10.23: Statistically significant differences between the new and old university sector - records of costs and revenues in early 1990s

	New University		Old University	
Question	**Yes**	**No**	**Yes**	**No**
Q30iii90**	17	21	19	9
Q30iv90*	15	23	19	8
Q30a90**	7	15	11	8

* Significant at the 0.05 level. ** Significant at the 0.1 level.

The data in Table 10.23 show that the old universities accounting systems, at the academic department level, were better developed in the early 1990s when compared with the new universities. These developments provide further evidence that the accounting systems and operational authority for expenditure were more devolved in the old universities in the early 1990s compared with the new universities (see Table 10.21 above). The difference in the developments of the accounting systems, particularly in relation to the research activities, are not totally surprising given the greater focus on research by the old universities in the early 1990s, and the external requirement to keep records of expenditure on such activities. This accounting system characteristic, it is argued, is one of an external bodies' requirement rather than a natural evolution that would emerge because of the influence of more general contingent variables upon a university. Furthermore, it is not surprising to learn that these specific accounting system characteristics were no longer different by 1999, since the new universities had experienced a greater increase in the research activities of staff when compared to the old universities. Even though there had been an upsurge in the research activity of the

new universities, there was still a statistically significant difference regarding the ability of academic departments to access accounting reports from the centralised accounting records on research expenditure in 1999 as shown in Table 10.24 (Q27ii99).

Table 10.24: Statistically significant differences between the new and old university sector - centralised accounting records of research expenditure

	New University		Old University	
Question	**Yes**	**No**	**Yes**	**No**
Q27ii99**	27	14	26	5

** Significant at the 0.1 level.

10.4.4.3 Course costing

The final area of statistical difference concerned the record keeping of costs and revenues of undergraduate courses at the academic department level in 1999 (Table 10.25). Whereas the old university sector's academic departments differed in terms of accessing costs on research activities (Table 10.24), the new universities were much more prevalent in recording costs and revenues of undergraduate courses (Q30i99, Table 10.25).

Table 10.25: Statistically significant differences between the new and old university sector - revenues and costs of undergraduate courses

	New University		Old University	
Question	**Yes**	**No**	**Yes**	**No**
Q30i99*	16	25	4	26

*Significant at the 0.05 level

10.4.4.4 Summary

The data in Tables 10.24 and 10.25 show a marked difference between the respective university sectors with each developing accounting systems that serve their needs in response to the internal changes that have taken place over the past decade.

It was shown that the new university sector had much more decentralised authority to develop and implement new undergraduate courses (Q15i99, Table 10.20) and the new university sector is much more likely to have developed some degree of course costing at the academic department level (Q30i99, Table 10.25). Furthermore, few would argue that the old university sector was not much more research focused in the early 1990s compared to the new universities, and Table 10.23 clearly shows the accounting systems developments in that area being statistically different to the new universities. Finally, Table 10.21 showed that the old universities had more decentralised authority for certain items of expenditure in the early 1990s and there is evidence in Table 10.23 that the old universities were more likely to have been keeping separate accounting records within the academic department during this period.

The analysis from the preceding paragraphs, and the data within the Tables in this section, would suggest that the evolution of accounting systems is more to do with the way in which universities have evolved internally rather than the impact that the external environment has had upon them. The evidence, in the section on the external environment (Q1-Q6), showed no statistical differences between the two sectors, yet the two sectors have evolved differently in their internal operations and accounting systems. This may imply that the external environment, as a contingent factor that explains

accounting systems evolution, is not a significant factor, although this will be discussed again once further data has been analysed in this thesis using MDS.

This chapter will now consider the differences that have arisen between the business and non-business academic departments.

10.5 Statistical differences between business and non-business departments

The original questionnaire was sent to a business related and a non-business related academic department to identify whether there had been any differences in accounting systems evolution at the sub-unit level within the university and also whether the contingent factors had impacted differently upon them. The structure of this section of the chapter will follow the same pattern as above, but the analysis of the questionnaires will naturally omit the responses from the general university management. The statistical analysis from SPSS is shown in Appendix 20 where referenced below.

10.5.1 External environment (Q1-Q6)

Within this section of the questionnaire, there are 3 areas of difference, although due to the low counts in certain cells the statistical significance of the differences cannot be relied upon. Nonetheless, these are highlighted in Table 10.26 as interesting differences between the two academic department types. It is worth reiterating the point that there were no statistically significant differences between the new and old university sector in this section of the questionnaire either.

The data in Table 10.26 relate exclusively to the postgraduate activity of the academic department and suggests that the non-business departments have experienced a greater

change in the way the course content has been delivered (Q1ii), used more information technology to deliver such content (Q2ii), yet have not experienced such an increase in application rates for places (Q3ivb).

Table 10.26: Differences between the business and non-business academic departments (external environment)

	Business Dept			Non-Business Dept		
Question	No change	Moderate change	Dramatic change	No change	Moderate change	Dramatic change
Q1ii	10	11	7	2	4	11
	Moderate/ significant decrease	No change	Moderate/ significant increase	Moderate/ significant decrease	No change	Moderate/ significant increase
Q2ii	0	9	18	0	0	17
Q3ivb	3	6	19	3	9	6

It will be recalled that the questions in this section of the questionnaire were measuring elements of the external environment as per the Gordon and Miller (1976) research. Whilst the 3 areas above relate exclusively to the postgraduate activity there is no pattern to follow regarding the specific elements that were measured. As Appendix 8 shows, Q1ii and Q2ii were measuring dynamism and heterogeneity in the external environment, whereas Q3ivb measured all three elements (dynamism, heterogeneity and hostility). Thus, it is not possible to map the changes that have been identified here with specific developments in accounting systems, as identified through the Gordon and Miller (1976) research.

10.5.2 Broader contingent variables (Q7 – Q18)

There are only 2 areas of difference in this section of the questionnaire, and the statistical significance of these cannot be relied upon due to the small number of counts in certain cells. Nonetheless, these are shown in Table 10.27.

Table 10.27: Differences between the business and non-business academic departments (broader contingent variables)

	Business Dept			Non-Business Dept		
Question	Moderate/ significant decrease	No change	Moderate/ significant increase	Moderate/ significant decrease	No change	Moderate/ significant increase
Q9i	0	0	26	0	3	15
	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised	Fully/ mostly centralised	Shared decision making	Fully/ mostly decentralised
Q13ia99	3	11	15	5	0	11

The data in Table 10.27 do not provide a great deal of information. The investment in marketing activity undertaken by the university (Q9i) is highlighted as different, although a more liberal interpretation would suggest that, overall, the investment has generally increased across the whole sector and the fact that 3 respondents indicated no change is not a significant factor when considering the complete picture of change in marketing investment.

Table 10.27 also suggests that the business departments are more likely to have greater decentralisation of authority when appointing full time academic staff by 1999 (Q13ia99). This is a strange phenomenon, as one would expect the decentralisation of authority to stem from the university and not to be academic department specific. The raw data confirms that where a business and non-business department from the same

university have returned their questionnaire, the degree of decentralisation is highly correlated with 80% (4 out of 5 pairs) indicating exactly the same degree of devolution. Therefore, the phenomenon experienced in Table 10.27 is more likely to do with the different practices of universities rather than the business/ non-business relationship.

10.5.3 Accounting system changes (Q19 – end)

The final section will consider the differences in accounting systems, but before that it is worth pausing to consider the implications of the above sections. In summary, there were no statistical differences in the way the external environment had impacted upon the academic departments. Furthermore, the internal operations of the two types of academic departments were not dissimilar. One may therefore expect that the accounting systems of the two academic departments would equally be no different if the contingency theory of accounting system developments applies to the university sector.

Within this section, there are a number of statistically significant differences. In total there are 18 differences, although 8 are not reliable due to the small number of counts in certain cells. Appendix 20 shows the specific questions and associated statistical analysis.

Given the proposition in the final paragraph of the preceding section these differences are surprising. Therefore, the statistically significant differences will be discussed below.

10.5.3.1 Revenue accounting records

Table 10.28 suggests that the non-business departments had access to accounting records that identified the revenue at the academic department level (Q20i90) and that this revenue stream was identifiable as teaching related (Q23i90) in the early 1990s.

Table 10.28: Statistically significant differences between the business and non-business academic departments – revenue accounting records

	Business department		Non-business department	
Question	**Yes**	**No**	**Yes**	**No**
Q20i90*	12	17	15	4
Q23i90**	8	13	8	3

*** Significant at the 0.05 level. ** Significant at the 0.1 level**

10.5.3.2 Costs of teaching and research

Furthermore, Table 10.29 shows that the non-business departments also had access to detailed costing information regarding the direct costs of teaching (Q24i99) and research (Q24ii99), as well as the full cost of teaching (Q24iii99) and research (Q24iv99) in 1999. Additionally, the non-business departments suggest that the centralised accounting function is able to create bespoke accounting reports for the academic department (Q28.99)

Table 10.29: Statistically significant differences between the business and non-business academic departments – direct and full cost of teaching and research

	Business department		Non-business department	
Question	**Yes**	**No**	**Yes**	**No**
Q24i99**	17	13	13	3
Q24ii99*	16	14	15	2
Q24iii99*	9	19	13	4
Q24iv99*	6	22	13	4
Q28.99*	5	22	10	9

* Significant at the 0.05 level. ** Significant at the 0.1 level

The picture that unfolds is one of the non-business departments' accounting systems evolving and becoming more sophisticated when compared to the business departments. This could be explained by a greater demand for such information by the non-business departments, but it would raise an interesting question of why, and for what strategic purpose. Reflecting on the experiences from the University case study in section one of this thesis, it was found that the Heads of the non-business departments did not fully understand some of the more basic accounting terminology. Therefore, it is surprising to see the same types of departments indicating that their centralised accounting function is capable of providing the information referred to in Table 10.29.

An alternative explanation may suggest that the respondents assumed their centralised accounting function provided this information. If this were the case then reference to the raw data would show an opposite response by the non-business department, when

compared to the business department. This was considered for the five paired cases where there were data, i.e. a business department and non-business department response had been obtained from the same university. Whilst there were instances of opposite responses being given, these were not consistently in the same manner as Table 10.29 suggests. Therefore, this alternative explanation is not wholly justifiable.

10.5.3.3 Research and other activities

Finally, Table 10.30 provides further support for the notion that the non-business departments' accounting systems have evolved at a different pace to the business departments. Here there is evidence that the record keeping of research (Q30iii90) and other activities, excluding undergraduate and postgraduate courses (Q30iv90) were more prevalent in the non-business departments. Interestingly, these same two areas were highlighted as being statistically different between the new and old universities in Table 10.23 above, with the old universities demonstrating greater development than the new universities in the early 1990s. A new piece of information, however, suggests that the accounting record keeping of other activities (Q30iv99) was still different in 1999.

Table 10.30: Statistically significant differences between the business and non-business academic departments – research and other activities

	Business department		Non-business department	
Question	**Yes**	**No**	**Yes**	**No**
Q30iii90*	6	18	13	6
Q30iv90*	5	19	13	5
Q30iv99*	11	15	14	4

* Significant at the 0.05 level

Given the similarities with the old versus new university analysis above, one may question whether the apparent accounting evolution in the non-business departments is partially explained by an excessive number of old university non-business department responses. Table 10.31 does not support this view and therefore the significant differences in the accounting system characteristics are explained by other, as yet unidentified, reasons.

Table 10.31: Frequency of business/ non-business departments analysed by new/ old universities.

	Business department	Non-business department
New university	16	13
Old university	13	6
Status unknown	2	2

10.6 Conclusions

This chapter has provided a detailed analysis of the questionnaires and has shown that whilst there have been some dramatic changes taking place within the external environment in which the university sector has operated, the ways that they have responded to these changes have been different. These differences have manifest themselves in the way in which internal decision-making and operational authority have evolved, and also, in terms of the accounting information system that are in place to support any devolution.

The whole sector clearly has not progressed along the same evolutionary path in terms of internal operations and accounting system developments. Furthermore, in relation to the extant contingency literature, it is difficult to relate the general theory to the fluid developments that have taken place within the sector. Having considered the new and old university sectors, differences emerge in the way they have evolved over the research period and some of these changes can be rationalised with Contingency Theory, others however, cannot. Likewise, the apparent similarities of the business and non-business departments in terms of their reactions to the external environment and internal operating authority would, according to the contingency theorists, suggest similar accounting systems evolution, yet this was not the case.

There are several limitations to the above analysis, however, as the straightforward Chi-squared test does not investigate any related associations within the data, and has fallen foul of limited data to work with. Therefore, a more rigorous investigation of the data will take place over the next three chapters where the responses to the questionnaire will be further analysed through Factor Analysis and Multi-Dimensional Scaling. This

analysis will help to visualise any, thus far, hidden relationships within the data and provide a further avenue of investigation of the application of Contingency Theory to the UK university sector.

CHAPTER ELEVEN

The External Environment as an explanatory variable in accounting systems developments

This chapter considers the specific Factor Analysis (using the principle components extraction method within SPSS) and Multi-Dimensional Scaling (MDS) as applied to the external environmental questions (Q1-Q6). This series of questions were considered together, following the work of Gordon and Miller (1976), where configurations of accounting system developments clustered together based on the changes that had taken place in the external environment (sub categorised as dynamism, heterogeneity and hostility). This was described in detail in Chapter Eight and it is the output and interpretation of this analysis that this chapter now considers.

The Factor Analysis has been performed with averaged missing data entered where necessary (see Appendix 12 for a discussion of how missing data was estimated), so that as full an analysis as possible could be undertaken.

As Chapter Ten showed, there were a number of differences between the new and old universities as well as between the business and non-business departments. Therefore, the Factor Analysis has been performed separately on these two classifications of the questionnaires to see whether the differences still appear to be significant, and a brief discussion will take place about these differences. The Factor Analysis interpretation will be succinct because it serves as an introduction to the more rigorous analysis that

will be completed via MDS, and therefore there would be a degree of repetition if Factor Analysis were to be discussed in great detail. Furthermore, any significant differences between the new/ old university sector, and the business/ non-business departments would emerge through the MDS analysis once these variables were regressed using the Logit regression technique into the MDS model.

It is worth considering the value that Factor Analysis brings to this section of the thesis given the fact that many of the questions that will be analysed from this section of the questionnaire were measuring multiple facets of the external environment (see Appendix 8). The Factor Analysis will show that the main themes of the external environment did not separate clearly and this might be expected given the measurement difficulties that were referred to in Chapter Six relating to dynamism, heterogeneity and hostility. Notwithstanding this, there was the potential for different facets of the external environment to emerge as dominant themes through the principle components extraction method that was applied on the data. There is, therefore, value in showing how this adds to, or frustrates, the understanding of how the different elements of the external environment are associated with accounting system changes.

The output from the Factor Analysis confirmed that were differences between each of the two classifications. Whilst these differences appeared through the chi-squared analysis in Chapter Ten, they were not statistically significant, and this was due primarily to the small amount of data contained within certain cells. The output from the Factor Analysis, however, provides further evidence that the external environment did impact differently on the new/ old universities and at the sub-unit level (i.e. business/ non-business departments). The implication of this, in relation to any developments in

the accounting systems, will be discussed through the MDS analysis that follows later in this chapter.

By way of a reminder to readers of this thesis, the MDS analysis that takes place in this chapter and in Chapter Twelve has combined the two academic department's responses. These two chapters do not analyse all three questionnaires as Chapter Thirteen considers the general university management questionnaires alone. Furthermore, a number of questions within the external environment section of the questionnaire (Q1-Q6), were not included in the general university management questionnaire and therefore it would have been inappropriate to include that questionnaire in this analysis. Chapter Twelve considers the broader contingent variables, including the external environment (Q1-Q18), and purposely does not include the general university management in that analysis either. This is so that the impact of the contingent variables and the developments in accounting systems can be separately analysed at the macro level within the university, rather than, as this chapter and Chapter Twelve consider, the developments at the sub-unit level.

11.1 External environment Factor Analysis of new versus old universities

Appendices 21 and 22 show the detail of the Factor Analysis for the new and old universities and the associated rotated component matrix from which the Factors can be given meanings. Tables 11.1 and 11.2 show the summary position of the new and old universities respectively, in factor order, and these will be discussed.

The data in Tables 11.1 and 11.2 include three separate headings – dynamism (Dyn), heterogeneity (Het), and hostility (Hos). These headings relate to the three areas of the

external environment that were specifically being measured via the questionnaire. Each of the Factors have been reviewed and where a specific question, within a Factor, had a value of 0.5 or greater (as determined from the rotated component matrix) then it was identified as a key explanatory variable in that Factor and thus used to identify the different traits of the external environment that were related to that Factor. A graphical summary of the key explanatory variables for each factor can be seen in Appendix 23.

Tables 11.1 and 11.2 show that the factor traits often cover all three characteristics of the external environment. Given the problems that were foreseen in measuring the specific elements of the external environment in Chapter Seven (as per the Gordon and Miller, 1976 research) this outcome is not overly surprising. The data within the two Tables, however, indicate that the external environment can be segregated rather than being viewed holistically. This is shown by the occurrence of a number of Factors that are comprised of two, rather than all three, elements of the external environment. The extent to which any segregation of the external environment can help to understand the evolution of accounting systems is, nonetheless, highly debatable and will be discussed below.

Table 11.1: Summary of the new university Factor Analysis

Factor number	Percentage explained	Dyn	Het	Hos
1	22.58	✓	✓	✓
2	14.50	✓	✓	
3	10.78	✓	✓	✓
4	8.46	✓	✓	✓
5	6.96	✓	✓	✓
6	6.25	✓	✓	✓
7	4.94	No predominant theme		
8	4.51	✓	✓	
9	4.06	✓	✓	
10	3.36	✓		✓

On the face of Tables 11.1 and 11.2 there does not appear to be a dramatic difference between the Factor order and the areas of the external environment with which they are associated. The data within these Tables, however, tends to hide the more subtle differences between the two classifications of universities that were identified in Chapter Ten. Tables 11.1 and 11.2 show some differences but the general picture is of the three areas of the external environment impacting in much the same way across the sector. When this view is considered in relation to the specific composition of the Factors (see the graphical summary in Appendix 23) a different picture develops. In fact there is only one specific question within factor 4 that is common to both university types and this is highlighted in green in Appendix 23.

Table 11.2: Summary of the old university Factor Analysis

Factor number	Percentage explained	Dyn	Het	Hos
1	20.56	✓	✓	✓
2	12.91	✓		✓
3	12.17	✓	✓	✓
4	10.40	✓	✓	✓
5	8.22	✓	✓	
6	7.96	✓	✓	✓
7	5.60	✓	✓	✓
8	5.12	✓	✓	
9	4.14	✓	✓	

The composition of the specific Factors demonstrates that the internal reactions of the two university sectors, to the external environment, have been markedly different. Furthermore, the Factor Analysis indicates that the different internal reactions of the two university sectors, has arisen out of reasonably common external environmental pressures (as shown in Tables 11.1 and 11.2). The specific questions that comprise the factors are used to identify the external environment elements (see Appendix 8) so that the findings from Gordon and Miller (1976) can be tested. The above Factor Analysis would suggest that the external environment has resulted in different internal reactions and therefore one may question the replicability of Gordon and Miller's findings in relation to the way in which accounting system changes are associated with them. These issues are highlighted here through Factor Analysis, but a more detailed account will be provided through the use of MDS.

The paragraph above would therefore cast some doubt over the cause and effect relationship of the external environment on accounting systems developments. It was shown in Chapter Ten that specific elements of the accounting systems developments of the old and new universities were statistically different yet the dynamism, heterogeneity and hostility of the external environment were not too dissimilar.

Therefore there appears to be little support for the findings of Gordon and Miller (1976) in this Factor Analysis, and if this is generally the case, then the MDS analysis that follows later in this chapter, should also confirm this to be the case.

11.2 External environment Factor Analysis of business versus non-business departments

The structure of this section follows the same layout as the preceding section. Tables 11.3 and 11.4 show, in factor order, the percentage that was explained by each factor and which elements of the environment were predominant within them. The detailed Factor Analysis and associated rotated component matrix can be seen in Appendix 24 and 25, as well as a graphical summary of the differences in the composition of the factors (Appendix 26).

The factors within Tables 11.3 and 11.4 show a greater degree of difference between the business and non-business departments when compared to the new/ old universities. Common to Tables 11.3 and 11.4 is the fact that all three elements of the external environment appear in the first three Factors, however subsequent Factors show that the predominant traits appear to be specific to the type of academic department.

The composition of the individual factors (see summary graphic in Appendix 26) shows that the internal reactions, as measured by questions 1 to 6 inclusive, of the business and non-business departments, to changes that have been taking place within the external environment, are not consistent with each other. This is shown, for example, by the first three Factors in Table 11.3 and 11.4, which cover all three elements of the external environment. The specific composition of these Factors (summary graphic in Appendix 26) shows marked differences in how the academic department has reacted internally to this aspect of the external environment.

Table 11.3: Summary of the business department Factor Analysis

Factor Number	Percentage	Dyn	Het	Hos
1	14.57	✓	✓	✓
2	11.58	✓	✓	✓
3	10.43	✓	✓	✓
4	8.79	✓	✓	
5	8.33	✓	✓	
6	8.30	✓		✓
7	8.12	✓	✓	
8	7.98	✓	✓	
9	6.10	✓	✓	✓

Two issues arise from this finding. First, that this finding is not consistent with the findings in Chapter Ten and second, that these different internal reactions to different manifestations of the external environment within the factors might lend some support to the findings of Gordon and Miller (1976).

The apparent contradiction with Chapter Ten needs to be addressed. Chapter Ten suggested that there were no statistically significant differences between the two academic departments when considering the individual question responses. Although there was some evidence of difference, this was not statistically relevant. Factor Analysis, however, considers the responses by a university (case) over the entire range of questions (Q1-Q6) rather than the responses to a single question by all the respondents. Thus, the profile of responses to questions are analysed and this is where the differences have arisen and have been reported by Factor Analysis.

Table 11.4: Summary of the non-business department Factor Analysis

Factor Number	Percentage	Dyn	Het	Hos
1	13.89	✓	✓	✓
2	12.01	✓	✓	✓
3	10.67	✓	✓	✓
4	9.98	✓	✓	✓
5	8.33	✓	✓	✓
6	7.76	✓	✓	
7	6.72	✓	✓	
8	6.51	✓	✓	
9	6.49	✓	✓	✓
10	6.42	✓	✓	

The second point is of some interest however. Given that there are different paths (internal reactions) being taken by the business and non-business departments to different external environmental pressures then there may be an cause and effect

relationship that can be identified regarding the accounting systems developments. This may lend some support to the findings of Gordon and Miller (1976). If this is the case, then the academic department classification should appear as a statistically significant variable in the MDS analysis once the accounting system changes have been regressed using the Logit technique into the MDS model.

Overall, one can see that the general impact of the external environment, as shown in the above Tables (Tables 11.1 – 11.4 inclusive), demonstrates that, at the macro level, there does not appear to be any dramatic difference in the way the external environment has impacted upon the sector (the factor ordering shows some differences but these are not easily interpreted). However, when reviewing the individual questions that appear in each factor (see Appendix 23 and Appendix 26) there does appear to be a difference in the way in which the internal operations of the universities have changed as a result of similar themes of the external environment. The Factor Analysis does not show a clear divide appearing between elements of the external environment, therefore the MDS analysis that follows will identify the specific questions that appear as significant in each dimension and consider these in relation to the accounting system changes that have evolved. This will provide a clearer understanding of how specific accounting system changes are associated with specific elements of the external environment (dynamism, heterogeneity and hostility) as measured by individual questions and thus help to understand more fully the relationships that exist.

11.3 Multi-dimensional scaling analysis of the external environment

MDS analysis was performed on the external environmental questions (Q1-Q6 inclusive), and as described in Chapter Seven, the number of dimensions in which to

analyse the data was set by reference to the results of the principle component analysis of Factor Analysis. The number of Factors in the above Factor Analysis would suggest that the MDS should be performed in nine dimensions (Cinca et al, 1999), however, SPSS can only perform the analyses in a maximum of six dimensions. Therefore, a six dimensional analysis of the data was undertaken and the resulting configuration of the model can be seen in Appendix 27 (see Table 11.5 for an explanation of the contents of Appendix 27).

11.3.1 MDS overview

It is not necessary to undertake separate MDS analyses by university type (new and old), or category (business and non-business department) as these characteristics can be tested within the resulting MDS model using Logit analysis. The MDS model is, in this section, solely based on the questions that measured the external environment. Profit and Logit analyses are then performed using questions as dependent variables and the co-ordinates of the six dimensional configuration as explanatory variables. The Profit and Logit analyses will identify whether the dependant variables are statistically significant in the MDS configuration, and more specifically within which dimension.

The data in Appendix 27 shows the detail of the MDS configuration in six dimensions and the first line is extracted in Table 11.5 below so that some meaning can be given to the data.

Table 11.5: Extract of the MDS analysis of external environmental variables (Q1-Q6)

Stimulus Number	Stimulus Name	1	2	3	4	5	6
1	VAR1	1.7336	0.5141	-1.4755	2.3617	0.6387	0.3206

The 'stimulus name' refers to the specific academic department (case) that responded. There were 52 responses from the business and non-business departments and each of these is represented by the term VAR1 through VAR52. The numbers that follow the 'stimulus name' are the co-ordinates of that specific academic department in a six dimensional space. Whilst a six dimensional graphic cannot be shown, pairings of these co-ordinates will be used to plot the academic department on a series of two dimensional graphs where there are statistically significant associations to be shown between the external environmental variables (Q1-Q6) and the accounting system characteristics that have been measured over the research period.

The MDS analysis of the external environmental questions (Q1-Q6 inclusive) showed a high RSQ value of 0.95158 (Appendix 27), which is similar in interpretation to the co-efficient of determination in traditional linear regression, and thus provides a measure of reliability within the data.

The external environment questions (Q1-Q6) and the questions relating to accounting systems developments (Q19 to end) were regressed (either using through ProFit or Logit regression depending on whether they were originally on a Likert or binary scale

respectively) into the MDS configuration map and those that emerged as statistically significant (at the 0.1 level), in the various dimensions, are summarised in Appendix 28. An example[38] of the ProFit and Logit statistical output is shown in Appendix II -A and an extract from this Appendix is shown in Table 11.6 so that one can identify how the data is used within the MDS analysis.

Table 11.6: Extract from the ProFit regression analysis into the MDS model (Q1i Changes to the delivery of undergraduate courses)

Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.741[a]	.549	.489	.70

a. Predictors: (Constant), DIM6, DIM4, DIM2, DIM5, DIM3, DIM1

Coefficients[a]

Mode		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std.	Beta		
1	(Constant	3.423	.097		35.34	.000
	DIM1	.180	.071	.254	2.531	.015
	DIM2	.507	.091	.557	5.560	.000
	DIM3	.374	.101	.371	3.701	.001
	DIM4	.153	.108	.142	1.419	.163
	DIM5	-.200	.115	-.173	-1.728	.091
	DIM6	-3.64E-	.128	-.029	-.284	.778

a. Dependent Variable: Q1.1 Change of delivery of u/g

The more important data has been highlighted within Table 11.6. In the lower section of the Table, DIM1, DIM2, DIM3 and DIM5 have been highlighted as the 'Sig' (statistical significance), of this specific question is high. DIM1, DIM2 etc. refer to the various dimensions of the MDS model, so it can be seen that this specific question is

[38] The full output of ProFit and Logit is available from the author for verification, but is excluded from the Appendices due to the length of the statistical analysis.

statistically significant in dimensions 1, 2, 3 and 5. Additionally the lower Table provides a co-ordinate position of where that specific question will appear in the various dimensions, and reading the B (Beta) column, one can see values of 0.180 for dimension one and 0.507 for dimension two (Schiffman *et al*, 1981). Thus this question can be plotted at point 0.180, 0.507 in a two dimensional graph which represents dimensions one and two of the MDS model. The co-ordinate point at which this question appears will allow a vector to be drawn through the origin of the graph in the manner that was described in Chapter Nine. The university cases that lie at the extreme of the direction in which the vector points, have greater probabilities of having experienced the specific attributes of the variable being analysed. University cases that lie at the extreme of the opposing direction of the vector have lesser probabilities of having experienced the specific attributes. Therefore there are universities at the polar extremes, and universities that lie in between. Those that lie in between have a greater or lesser probability of having experienced those specific characteristics dependent upon their actual position in the two dimensional space.

The general interpretation rules are, therefore, that the university cases that lie at the extreme of the direction in which: -

- An external environmental vector (pink squares) points have a greater probability of having experienced that specific characteristic, and visa versa.
- An accounting system vector (red diamond) points will have a greater probability of experiencing that specific characteristic or a change in the accounting system characteristic where the original data in SPSS were recoded for change over the period of the research.

- The university status (old or new) vector points are more likely to be new universities.
- The academic category (business or non-business) vector points are more likely to be non-business academic departments.

Once the co-ordinates have been used to plot the specific variables on the graph, the numerical value of the axis can be ignored as the interpretation that takes place refers only to the directions in which the vectors follow and the associations of them with one another. The data in Appendix 28 shows the summary position for all the questions that were statistically significant in the various dimensions having analysed each question in the same way as described above. The data underpinning Appendix 28 (see Appendix II – A for an example of the ProFit and Logit analysis) are used to identify the specific position of the statistically significant variable in the two dimensional graphic (by reference to the Beta value).

The highlighted data in the top section of Table 11.6 shows the importance of that specific question in any interpretation of the data that takes place. The higher the RSQ (r-squared) value, then the greater is the explanatory power of that variable in understanding the relationships and associations of the data within the various dimensions.

The MDS approach can be shown to be equivalent to principle component analysis, and, therefore, to Factor Analysis (Cinca *et al*, 1999). Each extra Factor explains less of the relationships within the data than the previous Factor. Thus, the early dimensions (one and two) explain much more of the relationships in the data than the latter dimensions

(five and six) and an approximation of the amount of the relationships in the data that each pair of dimensions explains can be obtained by reference to the Factor Analysis earlier in this chapter.

As the MDS was completed in six dimensions then there was the potential for 15 two-dimensional representations of the statistical analysis. The number of graphical representations of the data that is shown in this chapter is restricted only to the occasions where there are statistically significant associations between the external environmental factors and accounting system characteristics. The dimensions in which these occurred were: -

- Dimension 1 and 2 (graphical representation in Appendix II - B)
- Dimension 3 and 4 (graphical representation in Appendix II - C)
- Dimension 5 and 6 (graphical representation in Appendix II - D)
- Dimension 2 and 3 (graphical representation in Appendix II - E)
- Dimension 2 and 5 (graphical representation in Appendix II – F)
- Dimension 3 and 5 (graphical representation in Appendix II - G)

Each of these graphs have been inserted into Volume II of the Appendices so that they can be referenced whilst reading the analysis that takes place within this chapter. The first two dimensions (dimension 1 and 2) are explained in detail so that the balance of graphs, and resulting interpretation, in this, and subsequent chapters can be fully understood.

11.3.2 General interpretation guidelines

Each of the graphs in this chapter shows three pieces of information: -

- The blue diamonds represent an academic department (the case),
- The pink squares represent a statistically significant environmental factor (at the 0.1 level) and,
- The red diamonds represent a statistically significant accounting system characteristic (at the 0.1 level).

The only exception to this general coding rule relates either to the occurrence of: -

- The academic department category (business or non-business) as a significant variable (at the 0.1 level), or
- The status of the university (old or new) as a significant variable (at the 0.1 level).

Each of these will be clearly labelled on the respective graphs and will be coloured green. These were regressed into the MDS model using Logit analysis, in exactly the same way as the other binary responses (e.g. old university coded 0, new university coded 1). The statistical output was interpreted in the same manner as described above for the ProFit analysis in Table 11.5.

The graphs in the Appendices (II) also identify three specific academic departments - the University of Bath business department, the University of Edinburgh business department and the University of Fernleigh business department to help in the understanding of the data.

11.3.3 Interpretation of Dimension 1 and Dimension 2 (MDS Q1-Q6)

Appendix II - B shows that the accounting change (red diamonds) variables appear in three primary directions: east/west, south/north and northeast/southwest. The proximity

of the external environmental variables to the accounting system variables are not significant as it is the direction in which both occur that is important. Therefore it is possible to discuss each of these directions in turn to identify the configurations of accounting system changes/ characteristics that arose with the external environmental changes.

11.3.3.1 The east/ west direction

In this direction there is one accounting system characteristic that emerges in the same direction as a number of external environmental changes and one in the opposing direction. Thus, the emergence of staff pay budgets at the academic department level is associated with a number of external environmental factors, whereas the development of transfer pricing policies that have emerged as a result of budgetary devolution do not appear to be associated with the developments in the external environment.

So what does this mean? At a non-interpretive level it means that cases that lie to the left of the graph are more likely to have experienced the environmental and accounting system changes, whereas those that lie to the right are less likely to have experienced the external environmental changes. At an inductive level, however, this indicates that the devolution of financial authority (as measured by the devolution of staff pay budgets to the academic department) is associated with changes that have taken place in the external environment which may support the findings of Gordon and Miller (1976) although there is not enough evidence in this initial section to draw too many conclusions.

11.3.3.2 The south/ north direction

In this direction, there are three accounting system changes and the category of department is also significant. The accounting systems changes relate predominantly to the academic departments keeping records of costs and revenues of courses, and it is more likely that the non-business academic departments will have changed their procedures to keep such records.

The association of these accounting system changes with elements of the external environment would further suggest there is a causal link between them. It is not clear, however, from this directional analysis as to whether a pattern emerges of specific elements of the external environment being associated with accounting system changes. The environmental changes in the northerly direction were a combination of 'dynamism and heterogeneity' and 'dynamism and hostility', which provided support to the general contingent theorists. However there were environmental changes emerging in the southerly direction where there were no accounting system changes. One the face of this one could question the validity of the Contingency Theory to the university sector, however, whilst elements of the external environment appeared in isolation without any associated accounting system development in this specific dimension, these same questions do emerge with accounting system developments in other dimensions. That said, Contingency Theory does not rigidly suggest that an external environmental change will always result in an accounting system development, but rather that they are associated with one another. Thus, it is quite plausible to find environmental changes occurring in a particular dimension without a corresponding accounting system change. It would be much more of a discussion point if the opposite were found as then the accounting systems would be developing out of other reasons than the external environmental factors.

11.3.3.3 The northeast/ southwest direction

In the final direction, the change in the accounting system relates to the keeping of accounting records that identify expenditure at the academic department level. As can be seen on the graph (Appendix II - B) this accounting change is plotted far from the origin and therefore would have a long vector associated with it, signifying the high importance of it in the analysis. The lack of external environmental variables in close proximity to it would suggest that there are other factors, other than the external environment, that explain this significant development. At present the other factors cannot be determined as this MDS analysis concerns itself with using the external environment as the explanatory variables. It would therefore appear that, in this pair of dimensions, the external environment cannot explain this accounting system development.

Whilst this is only one of the two dimensional graphs that will be analysed in this section, it is nonetheless the most important of all of them. The combination of dimension one with dimension two explains more of the relationships in the data than any other combination of two dimensions and by reference to the Factor Analysis this amounts to approximately 25%. There is some support for the general proposition that the external environment is an explanatory factor in the developments of accounting systems, but the relationships between the accounting systems and elements of the external environment do not follow a clear pattern. Therefore, it is not possible to confirm the specific findings of Gordon and Miller (1976) from this initial analysis. To recap, Gordon and Miller (1976) suggested that as heterogeneity increases then the accounting system should reflect a divisionalised structure and as hostility increases

then the accounting system should become more complex. Whilst there was evidence of devolution of one of the more important elements of the accounting system (staff pay budgets), and increased complexity (developments in course costing), these accounting system changes could not be mapped onto specific elements of the external environment.

11.3.4 Interpretation of Dimension 3 v Dimension 4 (MDSQ1-Q6)

As can be seen in Appendix II – C, a number of accounting system changes emerge in three primary directions: south/ north, east/ west and southwest/ northeast.

11.3.4.1 The south/ north direction

In the south/north plane there are five accounting system changes that are associated with the external environmental changes. The university status is also significant and the universities in the northerly direction are more likely to be new universities.

What is interesting here is that the environmental changes are all related to the research requirements of the departments and these measure all three elements of the environment (Dyn, Het and Hos). This combination of factors indicates that as departments undergo changes in the proportion of staff undertaking research and the demand for such staff increases, then they also are more likely to change their accounting systems, particularly the recording of financial information at the academic departmental level. Whilst the changes in the environment are all synoptic of all three elements, one could argue that the increasing demand for research active staff is associated with competition (and therefore hostility). If this view is held then the accounting system has become more complex over time through the number, and focus,

of changes that have taken place. This would be in line with Gordon and Miller's view that as 'hostility increases the sophistication of the accounting system increases'. Furthermore, it would appear from this analysis that it is predominantly the new university departments that experience these changes and the new universities have developed more complex accounting systems in turn.

That said, it is not appropriate to provide a general rule that as hostility increases the accounting system always becomes more sophisticated. Whilst the data would be supportive of that view in a northerly direction the data is inconclusive when the opposing direction is considered. In the southerly direction there are still a number of environmental changes that measure, inter alia, hostility on the teaching activities, yet there are no such accounting system changes that emerge. At this stage it may appear that hostility experienced by academic departments in certain areas of their activities (research) has led to accounting system changes. This would be consistent with earlier findings in this research where it appeared that universities had not proactively developed their accounting systems in response to their teaching activities, yet had done so for research. Additionally there is some evidenced here to support the view that, generally, the new university departments have experienced changes in their accounting systems to reflect the changes in the external environment, but this is not the case with the older university departments

11.3.4.2 The east/ west direction

The easterly direction of this projection provides some interesting data. The external environmental changes that appear as significant, relate predominantly to the delivery and range of undergraduate courses. This, it is argued, is synonymous with process

invention and product invention as discussed in Chapter Seven. Furthermore, the occurrence of accounting system changes with these external environmental changes, or subsets of technological change, are entirely consistent with earlier studies (see for example, Burns and Stalker, 1961) and in line with the conclusions drawn by Reid and Smith (2000) that these relationships were to be expected in large firms. Furthermore, the academic department type was significant in this dimension; indicating that it was the non-business departments that were more likely to have experienced these changes rather than the business departments. Thus, as these external environmental changes were experienced then the accounting systems have become more complex through the academic department being more conscious of the direct costs they incur now (Q22i) and more analytical through the identification, and review, of financial incentives being offered to students (Q31aii-c, Q31b-c).

In the westerly direction there is one further accounting system characteristic which relates to the recording of revenues at the academic department level (Q20ai-c). This characteristic appears without any clear associations with the external environment, however a broader cluster has been circled to capture a range of external environmental questions. This cluster has been highlighted because this specific accounting system characteristic appears in isolation in two further pairs of dimensions, which are being discussed in this chapter (D2vD3 and D3vD5) and each time it is associated with the same external environmental questions (i.e. entry details of students). Thus it could be argued that the accounting system is becoming more complex as a result of increasing hostility in the marketplace for students and there associated entry qualifications. This view would therefore provide further support to one aspect of Gordon and Millers' findings.

11.3.4.3 The southwest/ northeast direction

The north-easterly direction highlights one accounting system change: the change in accounting records to show costs incurred on research projects (Q27ii-c). Whilst this appears in isolation it would be reasonable to relate this change to the new universities, which are more likely to be in the northerly direction. This finding would confirm the discussion in Chapter Ten, which suggested that the old universities already would have been costing their research activities, whereas the new universities would be more likely to embark upon this process as they became more research active over the past decade. Thus an accounting system change in this manner would not be unreasonable and could be linked with the findings under the south/ north heading above for this pair of dimensional analysis.

The analysis of these planes in this pairing of dimensions has provided evidence to support the general contingent literature and also an insight into the apparent differences within the university sector. It appeared that the new university non-business departments had undergone accounting system changes whilst there was an increase in hostility and they had undergone process and product inventions. The combination of these facets was in stark contrast to the old university business departments where there were changes occurring in the environment yet no changes occurring in the accounting systems.

11.3.5 Interpretation of Dimension 5 v Dimension 6 (MDSQ1-Q6)

The analysis of these two dimensions were supportive of the statements made earlier in this chapter; namely that accounting system changes are associated with external

environmental changes. The explanatory power of this pair of dimensions is the lowest of all the pairs of dimensions and by reference to the Factor Analysis these two dimensions will explain approximately 14% of the variation in the data. As can be seen in Appendix II – D, there are external environmental changes appearing in certain planes with accounting system changes and these will be discussed.

11.3.5.1 The east/ west direction

This analysis covers a broader cluster of variables as circled in Appendix II – D because this data can be interpreted together. The predominant theme of the accounting system changes relate to the developments in course costing. There is a greater probability of non-business academic departments having changed their accounting systems over the past decade to accommodate the need for costing of courses at undergraduate and postgraduate levels. The fact that course costing has appeared as a significant development is interesting given the debate that took place in Chapter Six on this topic, however, the external environmental variables that are associated with these developments do not provide a specific explanatory theme. Given the findings in Chapter Ten that course costing was more likely to develop out of internal operational requirements rather than changes taking place in the external environment, then the fact that there is no predominant external environmental theme to explain these accounting developments is not overly important. The findings here, however, do suggest that it is unlikely that the old universities would have developed their accounting systems over the past decade towards course costing. This view is evidenced by the proximity of the university status as a significant variable in the opposing direction to the course costing developments.

11.3.5.2 The south/ north direction

The accounting characteristics in the northerly direction confirm that budgetary devolution has been successful over the period of the study (Q33a) and that accounting information regarding teaching and research has become available at the academic department level (Q24v-c). Whilst these accounting system developments, and those in the east/ west direction as described above, are all suggestive of the accounting system becoming much more divisionalised, there is no clear evidence that this is because of an increase in the heterogeneity of the external marketplace. Whilst there appears to be various associations between the external environment and a move towards a devolved/ divisionalised accounting system, the findings of Gordon and Miller cannot be replicated.

11.3.5.3 The northwest direction

Finally, the university status appears as significant in the north-westerly direction (more likely to be new universities in the north west), but in that specific direction there are no accounting system changes. The significance of the university type is nonetheless important and suggests that the external environment has affected the new and old universities differently but accounting system developments do not explain the difference in this particular analysis. The difference is explained by other factors, which have not been addressed in this MDS analysis and therefore cannot be commented upon.

11.3.6 Balance of dimensions

Having considered the three primary pairings of dimensions (above) the full set of graphical pairings of dimensions was reviewed to identify those that had a number of

accounting system changes that emerged with external environmental changes. The following dimensions will be discussed, as there were a number of accounting system changes that were associated with the external environmental variables: -

- Dimension 2 v Dimension 3, Appendix II – E,
- Dimension 2 v Dimension 5 Appendix II – F, and
- Dimension 3 v Dimension 5 Appendix II – G.

Within these three pairings of dimensions there were similar accounting system characteristics as have already been described above. For example the circled area of Appendix II -E is very similar to the south/ north description of dimension 1 and dimension 2 (Appendix II – B). This similarity covers the specific external environmental variables that are associated with the accounting system changes. There are other instances of such similarities occurring and therefore this section will only address those associations that are newly formed within the final three two-dimensional graphs.

11.3.7 Interpretation of Dimension 2 v Dimension 3 (MDSQ1-Q6)

Appendix II - E clearly identifies the academic department as a significant variable, yet this is not associated with any specific accounting characteristics in this pair of dimensions. Whilst the external environment has impacted differently upon the business and non-business departments, one cannot infer from this analysis that a specific accounting change has taken place.

The south/ north direction of this pair of dimensions is of particular interest as there are a number of accounting system characteristics that are associated with very few external environmental variables. Whilst these accounting system characteristics have

individually appeared in the above analysis they have not clustered before in this manner. The small number of external environmental variables that are associated with these accounting system changes would suggest that there is something other than the external environment that is associated with change in this manner, but the MDS analysis in this section cannot provide any further assistance in understanding this as it has been performed solely on the external environmental questions. Further insights may be gained from the broader contingent variables analysis in the next chapter.

11.3.8 Interpretation of Dimension 3 v Dimension 5 (MDSQ1-Q6)

There is further evidence from analysing this two-dimensional graph (Appendix II - F) that the business/ non-business academic departments have reacted differently to the external environment, yet the accounting systems developments are not clearly associated with these different reactions.

Additionally, the university status is significant in the southerly direction and whilst this is associated with only one accounting system change it is, nonetheless, important. The new universities are more likely to have changed their accounting systems so that expenditure is identified at the academic department level. This supports the view from Chapter Ten that the old universities were likely to already have devolved this area of financial responsibility, whereas the new universities appeared to have devolved during the period of this research. The impact of this finding therefore suggests that the external environment can be a causal factor of financial devolution, but the degree of causation is, in the university sector, not generally applicable.

11.3.9 Interpretation of Dimension 2 v Dimension 5 (MDSQ1-Q6)

The final two-dimensional graph (Appendix II - G) does not provide any new avenue of information, but it is included because of the associations that appear between the accounting systems and the external environment. Each of these have, however, been discussed in the sections above.

11.4 Conclusions

Overall the interpretation of the statistical analysis in this chapter has raised some important issues. The Factor Analysis confirmed that the changes in the external environment had led to different internal reactions by the new/ old university sector and the business/ non-business academic departments. It was more difficult to state, however, that the universities had experienced different traits of the three elements of the external environment (dynamism, heterogeneity and hostility). It was possible to find some support for the findings of Gordon and Miller (1976), however, the picture that unfolds from the analysis in Chapter Ten, and this chapter, is that the developments in accounting systems, particularly within the university sector, cannot be simplified to a causal link between them and the external environment changes.

Otley (1980) suggested that a contingency theory must identify specific aspects of an accounting system that are associated with certain defined circumstances and demonstrate an appropriate matching. It would appear that the generalisation made by Gordon and Miller (1976) cannot be fully substantiated from this research. Notwithstanding this, there is clear support for the general contingency theorists that the environment, or parts of it, does have an association with the evolution of accounting systems in the UK university sector.

Of most interest was the finding that the evolution of accounting systems was significantly different between the new and old university sector and also at the sub unit level within the universities. The new universities' non-business schools have stood out as significantly different in the way in which the evolution of their accounting systems have taken place. This confirms the general statement by Otley (1980) that there is no one universal accounting system that applies to all organisations. It is suggested, however, that this can be expanded upon to state that the evolution of accounting systems is sector specific, and from early indications the evolutionary path of accounting systems developments would seem to be associated with age of the universities, especially since the new universities accounting systems appear to be undergoing much more evolution.

Finally, there appears to be more that the external environment can explain in the developments in accounting systems and the following chapter will consider the extent to which the broader contingent variables (including the external environment) are associated with these developments.

CHAPTER TWELVE

The Broader Contingent Areas as explanatory variables in accounting systems developments

This chapter considers the specific Factor Analysis and Multi-Dimensional Scaling (MDS) as applied to the broader contingent variables (Q1-Q18). The previous chapter considered the external environment as an explanatory contingent variable in the developments of accounting systems, however this chapter will refer to the broader sweep of questions from the academic departments questionnaires to gauge the extent to which they can help understand the evolution of accounting systems within the UK university sector.

The same format is used within this chapter to interpret the findings as was used in Chapter Eleven, i.e. Factor Analysis is used to understand some of the main themes in the data and then MDS will be used to analyse the data more rigorously.

12.1 Interpretation of the Factor Analysis Q1 – Q18

To ensure consistency with the analysis in Chapter Eleven, the data set (as amended for missing data – see Appendix 12) concentrated on the differences between the new/ old universities and the business/ non-business departments. Chapter Thirteen considers the data as it applies to the general university management.

First impressions of the Factor Analysis (Appendices 29 and 30) show that there were significantly more Factors, as would be expected given there was extra information

being analysed. The following section will discuss the more important Factors that emerge between the new and old universities before progressing on to the differences between the business and non-business departments.

12.2 Broader contingent Factor Analysis of new versus old universities

Appendices 29 and 30 show the detail of the Factor Analysis for the new and old universities and the associated rotated component matrix from which the Factors can be given meanings. Tables 12.1 and 12.2 show the summary position of the first six Factors for the new and old universities respectively and these will be discussed. The summary and discussion has been limited to the initial six Factors as these explain between 60% and 65% of the relationships within the data; furthermore the MDS analysis is restricted to six dimensions. The Factor Analysis serves as an introduction to identify the main themes within the data, and to address all the Factors, where some account for approximately 1% of the relationships in the data, would be inappropriate.

The data in Tables 12.1 and 12.2 show the Factor number, the percentage explained by that Factor and an indication of the predominant contingent theme that is represented by that Factor (see summary graphic in Appendix 31). The contingent themes are referred to as the external environment, market research and operational authority. The first theme emerges by reference to questions one through six inclusive and covers the external environment. The market research and operational authority themes emerge from the headings given to the two sections in the questionnaire that follow immediately after the external environmental questions (Q1-Q6).

Table 12.1: Summary of the new university Factor Analysis

Factor number	Percentage explained	General theme
1	21.69	Operational authority
2	12.95	Operational authority
3	8.34	External environment
4	7.47	Operational authority
5	6.43	Market research
6	5.15	External environment

The general themes that are highlighted in Tables 12.1 and 12.2 provide an interesting snapshot of the differences between the two sectors. Furthermore, it is important to note the location of the external environment as a theme in the ordering of the Factors. The fact that the operational authority appears to dominate the Factor themes may suggest that the way in which a university operationalises itself internally is an important characteristic and may help to understand the evolutionary process of the accounting systems.

Table 12.2: Summary of the old university Factor Analysis

Factor number	Percentage explained	General theme
1	16.88	Operational authority
2	13.54	Market research
3	9.72	Operational authority
4	9.15	Market research
5	7.17	Operational authority
6	6.69	External environment

12.3 Broader contingent Factor Analysis of business versus non-business departments

Appendices 32 and 33 show the detail of the Factor Analysis for the business and non-business departments and the associated rotated component matrix from which the Factors can be given meanings. As explained above the Table 12.3 and 12.4 will show the summary position of the first six Factors and give general themes to them. A summary of the more important variables that make up the Factors can be seen in the graphic in Appendix 34.

Table 12.3: Summary of the business department Factor Analysis

Factor number	Percentage explained	General theme
1	22.98	Operational authority
2	11.25	Operational authority
3	7.33	Operational authority
4	6.79	External environment
5	6.22	External environment
6	5.21	Operational authority

The Factor order suggests that the operational authority of the academic departments is more important in explaining the relationships in the data than the other two themes. The non-business department, however, clearly shows a high ranking for the external environment and this goes some way to supporting the MDS analysis from Chapter Eleven where the non-business departments were significantly different to the business departments (more so than the distinction between the new and old universities).

Table 12.4: Summary of the non-business department Factor Analysis

Factor number	Percentage explained	General theme
1	21.58	Operational authority
2	12.75	External environment
3	9.61	Operational authority
4	8.34	Market research
5	7.56	Operational authority
6	5.17	External environment/ Operational authority

The important message that comes from this preliminary analysis of the Factors is that the external environment, as a contingent variable, is ranked differently in the two department types and generally lower when compared to the operational authority in all four Tables above. This shows that there is a lot more variation in the data than is explained by the external environment alone. This provides one explanation why the analysis in Chapter Eleven was not wholly supportive of the conclusions reached by Gordon and Miller (1976) and may suggest that the manner in which a university operationalises itself internally is more of an explanatory variable than the external environment.

12.4 Multi-dimensional scaling analysis of the broader contingent variables

The MDS analysis that follows considers the full range of questions from the academic department questionnaire that measured changes in the external environment, market research activities and operational authority (Q1-Q18). The MDS analysis will be performed in exactly the same way as has been described previously in this thesis and the statistically significant variables will be highlighted once they have been regressed

using ProFit and Logit regression techniques. Appendix 35 shows the detail of the MDS configuration in six dimensions and a summary of the statistically significant variables that appeared in the various dimensions is given in Appendix 36, whereas examples[39] of the full statistical analysis (ProFit and Logit regression) are shown in Appendix II – H.

12.4.1 General interpretation guidelines

Each of the graphs now shows four pieces of information. The colour scheme is generally the same as was described in Chapter Eleven with the addition of a yellow triangle that represents the 'other contingent' variables that were measured with questions seven to eighteen inclusive (covering market research and operational authority). The university status (old or new) will be highlighted were it appears as a significant variable in the two-dimensional graphs, however, the academic department does not appear as significant in any of the dimensions, and thus the developments in accounting systems appear to be no longer business/ non-business department specific when considering the broader sweep of contingent areas.

The fact that the academic department classification is no longer significant is interesting in itself and suggests that the external environment, as an explanatory factor of accounting systems developments, is substantially weakened when considering the other contingent factors (market research and operational authority). Looking at this another way, one may argue that the explanatory power of the other contingent factors is much greater when considering accounting systems evolution and, therefore, it is possible to give a ranking of importance to contingent areas on such developments. This

[39] The full statistical analysis is available from the author for verification of the statistical analysis, but is excluded from the Appendices due to the length of the statistical analysis.

issue should result in the other contingent variables as being reasonably dominant in the MDS analysis that follows.

The MDS analysis has been performed in six dimensions and each of the pairs of dimensions have been reviewed to identify those that have associations between accounting systems characteristics and the broader contingent variables. Those that are to be discussed in this section are therefore contained within the Appendices as follows:-

- Dimension 1 and 2 (graphical representation Appendix II - I)
- Dimension 3 and 4 (graphical representation Appendix II - J)
- Dimension 5 and 6 (graphical representation Appendix II - K)
- Dimension 1 and 3 (graphical representation Appendix II - L)
- Dimension 1 and 4 (graphical representation Appendix II - M)
- Dimension 1 and 5 (graphical representation Appendix II - N)

12.4.2 Interpretation of Dimension 1 v Dimension 2 (MDSQ1-Q18)

The first impression that is gained from the primary two-dimensional analysis (dimension one v dimension two – Appendix II - I) is the large number of 'other contingent' variables that appears when compared to the external environmental variables. This would be expected given the predominant traits of the initial Factor Analysis were predominantly related to the other contingent variables and the Factor Analysis indicated that these variables explained more of the relationships in the data than the external environment variables. Upon closer investigation of the broader contingent variables (external environment and other contingent) that appeared in all the dimensions, it was significant that only **one** question relating to the external

environment (question 3.4b) had an RSQ value greater than 0.5 (a measure of importance in explaining the relationships in the data). This compared with over thirty 'other contingent' variables that had an RSQ value of greater than 0.5. This provided further evidence that the external environmental changes were less important as explanatory variables of the relationships within the data.

12.4.2.1 The southwesterly direction

Appendix II - I shows two distinct patterns of 'other contingent' variables; a series that develops in a southwesterly direction and a further series in a northwesterly direction. Following the general interpretation of the frequency analysis in Chapter Ten, Tables 10.19, 10.20 and 10.21 all showed significant differences between the new and old universities in terms of the degree of devolution that had taken place over the decade and the areas within Appendix II - I confirm this difference.

The southwesterly projection suggests that universities that lie in that direction were more likely to have devolved authority for a range of areas in the early 1990s (See Appendix II - I for a complete list of statistically significant areas). Interestingly, there are no accounting system changes that appear as significant in that specific direction which would suggest that accounting systems had not developed/ changed, over the decade, for those universities that had devolved operations in the early 1990s period.

12.4.2.2 The north westerly direction

The north-westerly projection shows that universities that lie in that direction were more likely to have devolved their operations by 1999, and given the proximity of the university status as a significant variable in the northerly direction, one could infer that

it was the new universities were more likely to have had experienced devolution by 1999. Furthermore, if one considers the circled area in Appendix II - I, there are numerous accounting system changes that emerge (some accounting system changes are plotted on top of one another, particularly in the northerly direction; hence, the list of accounting changes (Appendix II - I) shows more than there are plotted points on the graph). The accounting system changes that appear as significant, and are associated with those universities that had devolved operations in 1999 (not in the early 1990s), show that the degree of devolution of financial responsibility of those universities has been substantial. The changes that have taken place in terms of financial devolution over the decade include: -

- The allocation of overheads to the academic department (Q21-c),
- The academic department having considerable influence in the budget setting process (Q20biv-c),
- Major items of expenditure being devolved to the academic department, i.e. staff pay costs (Q20bi-c),
- Evidence of activity costing, i.e. undergraduate courses (Q30i-c) and research (Q30iii-c), and
- The ability to obtain bespoke accounting reports from centralised accounting records (Q29-c)

The profile of these accounting system changes suggests that the financial devolution process is more likely to have occurred by those universities that had also devolved their internal operational authority during the 1990s. Thus there is a strong association between the operating authority variables, and therefore the associated Contingency Theory, and the evolution of accounting systems.

12.4.2.3 The west/ east Direction

Finally, this initial pairing of dimensions shows a small number of accounting system developments that are associated with the external environment and market research activities of the universities. The accounting system changes suggest that the financial devolution process is evolving through changes being made in the internal allocation of overheads to the academic departments (Q21b) and the increase in time that is devoted to the financial management of the academic department (Q25i). Given these evolutionary elements of the accounting system are associated with increases in marketing activities and elements of the external environment then there is evidence, therefore, to confirm that the more analytical and responsive the universities are in making decisions, the more sophisticated and complex the accounting system needs to become (Gordon and Miller, 1976). This, it is argued, is evidenced through the increasing amount of academic time that is devoted to the financial management of the academic department.

12.4.3 Interpretation of Dimension 3 v Dimension 4 (MDSQ1-Q18)

Appendix II - J shows a much more scattered profile of the contingent variables in all directions, however there were some similarities to the interpretation already provided in the analysis of dimension one and two above.

Once again the university type is significant with the new universities more likely to be in the south-westerly direction where the contingent variables exclusively relate to the degree of authority for course development (undergraduate, postgraduate and other courses in the early 1990s and 1999). This suggests that the new universities appear to have had much more devolved authority to develop courses when compared to the old

university sector, however, the degree to which this is associated with, or helps to explain the evolution of the accounting systems is very limited.

The general picture that unfolds from the analysis of this pair of dimensions is not as clear as the analysis from dimension one and two. There appears to be accounting characteristics that are associated with many, and varied, elements of the broad contingent variables, namely the external environment, market research and the operating authority. Therefore it is more difficult to show that certain developments in the accounting systems are related to, or associated with, specific categories of the broader contingent variables that were used to build the MDS model in these two dimension.

The fact that this pair of dimensions does not add to the debate should be considered in the light of the remaining pairs of dimensions that can be interpreted. Dimensions three and four explain approximately 16% of the relationships within the data (see Factor Analysis values of Factors three and four above), whereas dimensions one and two explained approximately 35%. The lack of explanatory power of dimensions three and four will be compensated by the different combinations of dimensions that will be analysed throughout the balance of this chapter.

12.4.4 Interpretation of Dimension 5 v Dimension 6 (MDSQ1-Q18)

Whilst this dimensional analysis explains the least amount of the relationships within the data it still supports the findings from dimension one and two; i.e. operating authority devolution co-existed with accounting system developments, (see Appendix II - K)

The accounting system characteristics are predominantly related to changes that have occurred at the centralised level within the universities. This would suggest that the changes that occur in the internal operations of a university may result in either changes to the accounting systems at the devolved level and/ or to changes at the centralised level. Whilst the internal operational changes that were significant in this analysis were not as extensive as found in dimensions one and two, they were, nonetheless, common to both. Thus common devolutionary powers seem to result in accounting systems evolving at the centralised level and/ or at the sub-unit level within a university.

12.5.5 Balance of dimensions

Having considered the three primary pairings of dimensions (above), the full set of graphical pairings of dimensions was reviewed to identify those that had a number of accounting system changes emerging with the broader contingent variables. In total there were 15 pairings of dimensions and the specific dimensions that had statistically significant associations will be discussed are:-

- Dimension 1 and 3 (graphical representation Appendix II - L)
- Dimension 1 and 4 (graphical representation Appendix II - M)
- Dimension 1 and 5 (graphical representation Appendix II - N),

Much of the analysis of the above pairs of dimensions confirms what has already been discussed above, i.e. the operating authority variables (Q13-Q18 inclusive) prominently emerged with accounting system changes and so the discussion that take place in the following sections will concentrate on new analyses as far as possible.

12.5.6 Interpretation of Dimension 1 v Dimension 3 (Q1-Q18)

In Appendix II - L, an area is circled to highlight a specific characteristic trait of universities. So far, the analysis of the dimensions has concentrated on the extent to which the operating authority contingent variables dominated the associations with accounting system changes. The area that is highlighted in Appendix II - L is, however, comprised mainly of the external environment and market research contingent variables. It was hypothesised in Chapter Seven that 'the changes that had taken place in the university sector during the 1990s would have caused many universities to become much more proactive in their style of decision-making through the use of competitor information'. These characteristics have clustered together in the area that has been circled. Similar patterns emerge in dimensions one and four (Appendix II - M) and dimensions one and five (Appendix II - N). Each are circled to highlight the specific area in each of these graphs and this phenomenon is referred to as the dynamism of the environment.

12.5.6.1 Dynamism of the environment

The non-existence of any operating authority variables indicated that a separate contingency variable was emerging within this data and had become a predominant theme when considering the accounting system changes. The work of Hayes (1977) provided some direction here where it was identified that three contingent variables formed management accounting systems, i.e. sub-unit interdependence, dynamism of the environment and work method specification. It is argued that the phenomenon that emerges in the three profiles above is akin to the 'dynamism of the environment' as identified by Hayes (1977).

Hayes defined the dynamism of the environment to include marketing intensity, rather than the definition put forward by Gordon and Miller (see Chapter Seven). When the prominent variables that emerged in the three profiles above were analysed, they related predominantly to the external environment and marketing activities of the universities. Each environmental question that was used in the questionnaire measured, *inter alia*, the dynamism in the environment, and the significant marketing questions that also emerged in these profiles related to an increase in marketing activity of the university. Therefore it is argued that the phenomenon that is being experienced within these various dimensions is consistent with one of the findings of Hayes (1977).

12.6 Conclusions

The analysis of the broader range of contingent variables has resulted in two main themes emerging that appear to be associated with accounting system developments; the operating authority and the dynamism of the environment. Furthermore, the operating authority, as a contingent variable appears to dominate as an explanatory force behind accounting system developments in the UK university sector. The apparent demotion of the external environment variable suggests that a rank order can be given to certain contingent variables with the operating authority ranked higher than the external environment.

In contrast to the findings of the previous chapter the academic department was no longer significant in terms of the changes that were experienced or in the accounting systems that had developed. The broader range of contingent variables had affected the academic departments, as a whole, in much the same manner. However, whilst the academic departments had not developed differently over the period, there was strong

evidence to suggest that the university status (old or new) was still important with different developments taking place in terms of the accounting systems and devolution of operating authority.

It appears from this analysis, and from the previous chapter, that the new universities were more likely to have experienced change in their external environment, devolved their internal operations and consequently their accounting systems had evolved. Such changes in the external environment and internal operational devolution would, as the Contingency Theory suggests, lead to accounting system changes. Therefore this analysis is entirely consistent with the extant literature.

Furthermore it would appear from this chapter that the older universities were more likely to have already experienced a degree of operational devolution (more so than the new universities), yet the changes in the university sector during the 1990s did not have such an impact upon them in terms of further operational devolution and accounting system developments. Therefore, the relationship between the external environment and the accounting systems evolution is not so strong. All universities had been exposed to the same external environment changes, yet the internal changes were distinctly different. Whilst the extant contingent literature is verifiable as regards the evolutionary process that the new universities have travelled, there are questions concerning the applicability of the theory to the old university sector.

The following chapter considers the questionnaire responses from the perspective of the general university management to identify whether there is support for these findings.

CHAPTER THIRTEEN

The Broader Contingent Areas as explanatory variables in accounting systems developments from the perspective of the General University Management

This chapter considers the specific Factor Analysis and MDS analysis as applied to the broader contingent variables from the general university management questionnaire. The actual question numbering of this questionnaire is slightly different when compared to the those sent to the academic departments, because certain questions were not appropriate for the general university management. The question coding that is used to interpret the findings is, however, consistent with that used in the previous two chapters.

The general university management questionnaire was used to capture the changes that had occurred holistically within the universities. The analysis of the external environment impact on the university is limited due to the fewer number of questions that were posed, however this section is still covered and the findings from the previous two chapters have provided some valuable insights. The range of questions covering the other contingent variables (market research and operating authority) is much the same as was used in the academic department questionnaire. The views that are obtained from the broader sweep of all these areas (external environment, market research and operating authority), together with the general changes in accounting systems within the universities should help to further understand the relationships between the contingent variables and accounting system evolution.

A further avenue of comparative analysis with this data was to identify if there were any differences of views between the general university management and the academic heads of department as regarded changes that had occurred to accounting systems and the internal operations of the university over the time of the study.

The same format will be used to interpret the findings as was used in the previous two chapters. Initially Factor Analysis will be used to understand some of the main themes in the data and MDS will follow.

The general interpretation of the Factor Analysis of the general university management was broadly consistent with the findings of the previous chapter and as such did not provide a great deal of new information. The MDS analysis did, however, provide a different avenue of analysis with some interesting findings.

13.1 Interpretation of the Factor Analysis

To ensure consistency in the analysis, the Factor Analysis was performed for the new and old universities separately (the academic department classification was not applicable).

Appendices 37 and 38 show the detail of the Factor Analysis for the new and old universities and the associated rotated component matrix from which the Factors can be given meanings. Appendix 39 provides a summary graphic of the individual Factors from which Tables 13.1 and 13.2 have been compiled. These show the summary position of the first six Factors for the new and old universities respectively and these will be discussed.

Table 13.1: Summary position of the new universities Factor Analysis (General University Management)

Factor number	Percentage explained	General theme
1	31.76	Operational authority
2	17.54	Operational authority
3	10.05	Operational authority
4	9.62	Market research
5	7.16	Market research

The summary and discussion has been limited to the initial five Factors as these explain between 65% and 76% of the relationships within the data. The MDS analysis, whilst restricted to a maximum of six dimensions, had to be performed in only five for this data as SPSS reported the analysis would be unreliable in the six dimensional analysis (Appendix 40).

Table 13.2: Summary position of the old universities Factor Analysis (General University Management)

Factor number	Percentage explained	General theme
1	20.31	Operational authority
2	16.43	Operational authority
3	10.69	Operational authority
4	9.85	Operational authority
5	8.05	External environment

Tables 13.1 and 13.2 confirm the general picture that emerged in Chapter Twelve that the operational authority theme emerges as dominantly and the external environment is demoted in order of importance. Thus, at the general university management level, these findings are entirely consistent with those from the perspective of the academic departments.

As mentioned above, the Factor Analysis does not provide any new information, but the consistency of findings is important. The support that is found in the ordering of the Factors could enable one to develop a ranking of contingent variables that appear to impact upon accounting system developments. The concluding chapter will consider this with regard to developing into a more generalisable theory about how and why accounting systems have developed in the UK university sector over time.

13.2 Multi-dimensional scaling analysis of the broader contingent variables (General University Management)

The MDS analysis that follows considers the full range of questions from the general university management questionnaire that measured changes in the external environment, market research activities and operational authority (Q2-Q14 of the general university management questionnaire). To avoid any confusion in question numbering, the question codes that are used in the analysis that follows will be consistent with those used in the earlier chapters. Thus, whilst the actual question numbering was different, one can read this chapter as if there were no differences.

The MDS analysis will be performed in exactly the same way as has been described previously in this thesis and the statistically significant variables will be highlighted

once they have been regressed using ProFit and Logit regression techniques. Appendix 41 shows the detail of the MDS configuration in six dimensions and a summary of the statistically significant variables that appeared in the various dimensions is given in Appendix 42, whereas examples[40] from the full statistical analysis are shown in Appendix II – O.

13.2.1 General interpretation guidelines

Each of the graphs shows four pieces of information. The colour scheme is exactly the same as was described in Chapter Twelve and the university status (old or new) will be highlighted were it appears as a significant variable in the two-dimensional graphs. Unfortunately responses from the University of Edinburgh and the University of Bath were not obtained for this specific questionnaire, therefore, the University of Strathclyde and the University of Southampton are shown in place of them.

The MDS analysis has been performed in five dimensions and each of the pairs of dimensions have been reviewed to identify those that have associations between accounting systems characteristics and the broader contingent variables. The five dimensional analyses of the data reported very few accounting system changes that were significant in the various dimensions, therefore it is only worthwhile looking at three pairings of dimensions as these encompassed all of the accounting system changes. These are: -

- Dimension 1 and 2 (graphical representation Appendix II - P)
- Dimension 3 and 4 (graphical representation Appendix II - Q)

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[40] The full statistical analysis is available from the author for verification, but is excluded from the Appendices due to the length of the analysis

- Dimension 1 and 5 (graphical representation Appendix II - R)

13.2.2 Interpretation of Dimension 1 v Dimension 2

The north/ south projection of Appendix II - P is highlighted as the accounting system changes are associated with the university status and, interestingly, the external environment as a contingent explanation. The accounting system changes suggested that financial devolution (as represented by the allocation of overheads to the academic department, Q21-c) was more likely to occur in the new universities (as shown by the proximity of the university status on the graph) and there was evidence that these universities had to allocate additional resources to fulfil these responsibilities (Q26i).

Of greater interest is the apparent contradiction between the initial findings of this, the primary pair of dimensions in MDS and the Factor Analysis above. The Factor Analysis ranked the external environment low in comparison to the operating authority, yet clearly, the external environment is a distinguishing element in this MDS analysis. By reference to earlier findings in this thesis, it was shown that the new universities appeared to react to the changes in the external environment much more than the old universities and therefore evolved their accounting systems. This point is verified in this MDS analysis also. Thus, whilst the external environment does not appear to be so important when considering specific accounting system developments of the new universities or the old universities separately, the external environment is clearly more likely to be an explanatory element in the evolution of the new universities accounting systems. Furthermore, the new universities appear to be considering resource bottlenecks in their strategy development (Q32bi and Q32bii), and this finding may help

to understand the reason(s) for the different evolutionary path being followed by the types of universities. This will be explored in the conclusion at the end of this chapter

13.2.3 Interpretation of Dimension 3 v Dimension 4

The occurrence of statistically significant contingent variables is much more widely distributed within these two dimensions (Appendix II - Q). In the west/east direction, the contingent variables that occur with the accounting system changes (easterly direction) are associated solely with operating authority contingent variables, which supports the general findings from Chapter Twelve.

The northerly direction suggests that, coupled with the devolution of operational authority (for example the appointment of staff, Q16vi.99 and greater influence in the degree of remission given to staff, Q13iv.99), the academic departments are more likely to be more involved in the budgeting process (Q20biii-c) and more conscious of the costs it is incurring (Q22ii). Thus the internal operational devolution is more likely to be associated with greater financial responsibility at the devolved level within the universities.

13.2.4 Interpretation of Dimension 1 v Dimension 5

This final pairing of dimensions was the only one remaining where accounting system changes emerged in association with the broader contingent variables (Appendix II – R) Of this pairing of dimensions only the northerly direction showed an accounting system change (as circled). The accounting system change related to the increase in the amount of academic time that was taken up through financial management and was associated with questions that almost exclusively related to the environment and market research

activities. It is argued that the contingent explanation for this association is that of the dynamism of the environment (Hayes, 1977) as explained in Chapter Twelve.

13.3 Conclusions

Having reviewed the MDS analysis of the general university management questionnaires, there appeared to be fewer contingent and accounting system variables that were associated with each other when compared to the previous chapter. It is suggested that the general university management, on the whole, view the changes that have occurred at a macro level and therefore will undoubtedly average the overall effect for the specific university. This averaging effect of changes over the whole of the university could hide extremes of differences that had been experienced by the individual academic department and thus result in fewer statistically significant differences, and thus significant associations, appearing between contingent variables and accounting system changes.

The averaging of responses had not affected the overall view of how the contingent variables appeared with accounting system changes and therefore did not invalidate this research. It could, however, explain why Contingency Theory has traditionally been used to explain why accounting systems are not universally the same across different organisations. At the macro level, the differences of accounting systems will still appear and cluster with some broad contingent variables, however these differences and clusters may be smoothed and may hide the differences that occur within subsets of an organisation. Therefore to understand more comprehensively how accounting systems evolve one needs to probe more deeply into an organisation/ sector.

It would appear from this analysis that there were two core contingent themes that emerged and they were ranked in importance. First, the operating authority contingent variable emerged as the dominant theme and the dynamism of the environment was ranked second. This broad finding was also consistent with the findings of the previous chapter where it became apparent that the operating authority contingent variables were more important in explaining the association with the accounting system changes when compared the external environmental contingent variable.

Furthermore, this chapter has flagged and underlined an interesting insight into the university sector by confirming that the university status (old or new) is an important variable when it comes to how the contingent variables and accounting system changes have occurred. The two sectors have clearly evolved very differently, yet the complete university sector has been exposed to the same external pressures. Given the different paths that have been trod by the new and the old universities, as regards their accounting system changes, it is suggested that there is an further external force, not recognised in the extant literature which is, albeit partially, responsible for these differences. It is suggested that the impact of external funding pressures could go someway to explain the different evolutionary path.

Through the analysis of dimensions one and two above, it was shown that the new universities were more likely to have developed their accounting systems and this was associated with the external environment. Furthermore, an insight was provided of the resource bottleneck management that was being employed by the new universities to develop plans for teaching and research. Given the financial pressures that exist in the university sector, the view is widely held that the new universities have experienced

greater financial hardship than the old universities, partly because of the over-reliance on HEFC teaching income. It is therefore suggested that this was the catalyst for change, the external shock, which forced new universities to evolve. The older universities were not immune to the financial shock, but the impact of it was not so severe and thus the need to evolve, because of the changes taking place in the external environment, was not so critical.

CHAPTER FOURTEEN

Summary and Conclusions

This thesis has considered the specific development and failure to implement a costing system within a particular University, discussed the theoretical costing systems that could be used within universities and analysed the application of contingency theories of accounting system developments in the UK university sector during a further period of significant turbulence in the external environment in which they operated.

14.1 The University case study

The post mortem of the case study that was developed in the initial section of this thesis identified a number of ingredients that were missing or handled badly in the implementation of the activity based costing (ABC) system. The general areas that facilitated the demise of the ABC system were: -

- The failure of the University to involve the users of the information (the academic Heads) in the process,
- No formal educational programme to help the non-financial managers understand the principles of ABC, or that the technique would provide more realistic costs of the courses,
- The lack of personal acceptance by the academic managers that there was value in using the ABC principles, and
- The problem of keeping to a structured timetable and presenting the findings in a timely, and consultative, manner.

These general areas could have application in many organisations and the evidence from the literature (see for example Innes and Mitchell, 1991; Cobb *et al*, 1992) would suggest that any organisation that was intending to implement a new costing system should have due regard to them.

The University case study did not, however, suggest that the above areas were the sole determinants of the failure to implement the course-costing model (CCM). Indeed there were many issues that were specific to the University and these concerned the internal politics and changes to the balance of power, of senior staff, within the University. These areas, no doubt, added to the fluid environment in which the CCM was being developed and coupled with the more general areas above, eventually led to a failure to implement the CCM.

Out of the ashes of the CCM was developed a much simplified school-costing model where overheads were allocated to the academic schools on two main cost drivers (student full time equivalent numbers and a percentage of income). The University's financial control model was therefore to ensure that the academic schools sought to, at a minimum, breakeven. It was debated that, whilst the University may seek to exercise financial control at this level, the academic school may wish to develop costing systems that provided some indication of where costs were being incurred at the school level. A range of alternative costing systems were discussed but the debate was not able to categorically suggest a best system as the specific requirements of differing universities would probably result in different accounting systems evolving.

The University case study in section one of this thesis provide some rationale as to why (according to Mitchell, 1996) many universities allocated overheads to schools and had not developed their systems further. The case study did not however, help to more fully understand why, at a broader level accounting systems within the university sector had developed in the way they had. Therefore the application of contingency theory to accounting systems developments within the UK university sector was considered.

14.2 The contingent theorists

The contingent theorists (see for example Gordon and Miller, 1976; Otley, 1980;) suggested that there were specific factors that would impact upon the evolution of accounting systems. Gordon and Miller's (1976) research firmly identified the external environment as one of these contingent variables, although it was broken down into three main elements; dynamism, hostility and heterogeneity. The interplay of these elements enabled Gordon and Miller to identify archetypes of firms. One of these was the 'stagnant bureaucratic organisation', and, in Chapter Seven it was hypothesised that the university sector could be likened to this archetype.

14.2.1 The university sector as a stagnant bureaucratic archetype

In Chapter Seven it was hypothesised that the university had historically operated in 'an extremely stable and homogeneous environment' (Gordon and Miller, 1976, pp.67), yet the environment had become more dynamic and heterogeneous over time. The evidence from section two of the thesis supported the fact that the general environment had become much more dynamic, hostile and heterogeneous during the 1990s as measured through a series of questions within the questionnaire (Appendix 8).

A stagnant bureaucratic organisation would (according to the archetypical model) have 'structural and decision-making styles were geared towards the conditions of the past' (*ibid*, pp.67), which would result in decisions being taken without adequate analysis. This was not found in the university sector. To the contrary, it was found that there had been a substantial investment in internal and external market research activities concerning the stakeholders requirements.

Furthermore, it was suggested in Chapter Seven that in order to manage the external pressures universities should undertake a number of tasks to create a more appropriate and effective accounting system. These were: -

- The collection of market orientated data to ensure that new and existing courses; research and consultancy activities are meeting the requirements of the stakeholders. Evidently this was happening and the majority of universities reported a substantial increase in this area (see Table 10.6, Chapter Ten)
- More attention should be directed towards financial forecasting in the short to medium term at a decentralised level. There was evidence of this as measured through the increase in the amount of time that devoted to financial management within the academic department (see Tables 10.10 and 10.15, Chapter Ten).
- Adequate and timely reports should enable a comparative check to be made between actual and expected results. This may be qualitative as well as financial. There was evidence of accounting records being maintained at the academic department level and a progression of this to become more commonplace over the 1990s as demonstrated in Table 10.11 (Chapter Ten).
- If considered appropriate, a move towards performance indicators may assist the monitoring of the newly created and therefore more autonomous units within the

university. Specific questions were not posed regarding performance indicators, but the evidence was that the academic heads were much more responsible for meeting financial targets set by the university (see Table 10.10, Chapter Ten), and one may infer from that that there would be some form of performance indicators being used. It is recognised, in hindsight, that the inclusion of questions within the questionnaire on the specific point of performance indicators would have led to an improved avenue of analysis.

Thus the structural and decision-making styles had adapted and evolved over the period of this study and therefore, the hypothesis that the university sector can be likened to a stagnant bureaucratic organisation is not substantiated.

14.2.2 The impact of the external environment on accounting systems development within the UK university sector

The findings in Chapter Eleven suggested that the developments in accounting systems, within the university sector, could not be simplified to a causal link between them and the external environment. This was because the internal reactions of universities, to similar changes in the external environment, were not consistent. Furthermore, Chapter Twelve suggested that the accounting system developments were more likely to be as a result of changes to the internal operational authority of the university rather than the way the external environment had impacted upon the university. Therefore there was little support for the findings of Gordon and Miller (1976) concerning the relationship between the external environment and the evolution of accounting systems within the university sector. The lack of support for Gordon and Miller's findings must however be balanced against one of the limitations of this research concerning the difficulty of

measuring the individual elements of the environment in isolation (i.e. dynamism, hostility and heterogeneity).

14.2.3 The broader contingency theory on accounting systems developments within the UK university sector

Chapters Twelve and Thirteen demonstrated that the devolution of internal operational routines to the academic department were generally associated with significant accounting system changes. This was particularly the case within the 'new' university sector where there appeared to be a greater emphasis of devolution in the internal operations and accounting systems.

The apparent splitting of the two university sectors was rationalised and it was suggested that there was a change agent that existed within the 'new' universities and not in the 'old'. This 'change agent' was finance, and it is suggested that due to the historically heavy reliance that 'new' universities had on HEFC funds (HEFCE, 1995a), and the substantial reduction in real terms of university funding, they had to react by devolving their internal operations (including financial management). Devolution was necessary to enhance the responsiveness and efficiency of the university as the financial pressure was felt. It is not suggested that the 'old' universities did not experience this pressure, but as the majority of them would have had significant streams of other income (for example research and endowments) then the reduction in funding for teaching was not felt so hard.

A further contingent theme emerged in the analysis of the previous two chapters, namely the 'dynamism of the environment' (Hayes, 1977). This contingent variable was

related to the changes in the external environment and the marketing intensity of the university. It was therefore suggested that the dynamism of the environment emerged as a contingent theme and could therefore help to explain the evolutionary process of accounting systems in the UK university sector.

Otley (1980) suggested that a contingency theory must identify specific aspects of an accounting system that are associated with certain defined circumstances and demonstrate an appropriate matching. From the analysis of section two of this thesis there is a clear association between the devolution of accounting systems within the new universities and the devolution of internal operational authority, which it could be argue have come about because of the changing external environment. Thus, a causal relationship develops.

This causal relationship cannot be applied to the whole university sector and the fundamental reason for the lack of general applicability is the omission of the 'change agent' in the 'old' university sector. The 'old' university accounting systems have evolved over time, but the time frame either pre-dates this research or the evolution has occurred without a statistically significant theme emerging during this research period.

14.2.4 The academic department as a significant variable in the evolution of accounting Systems

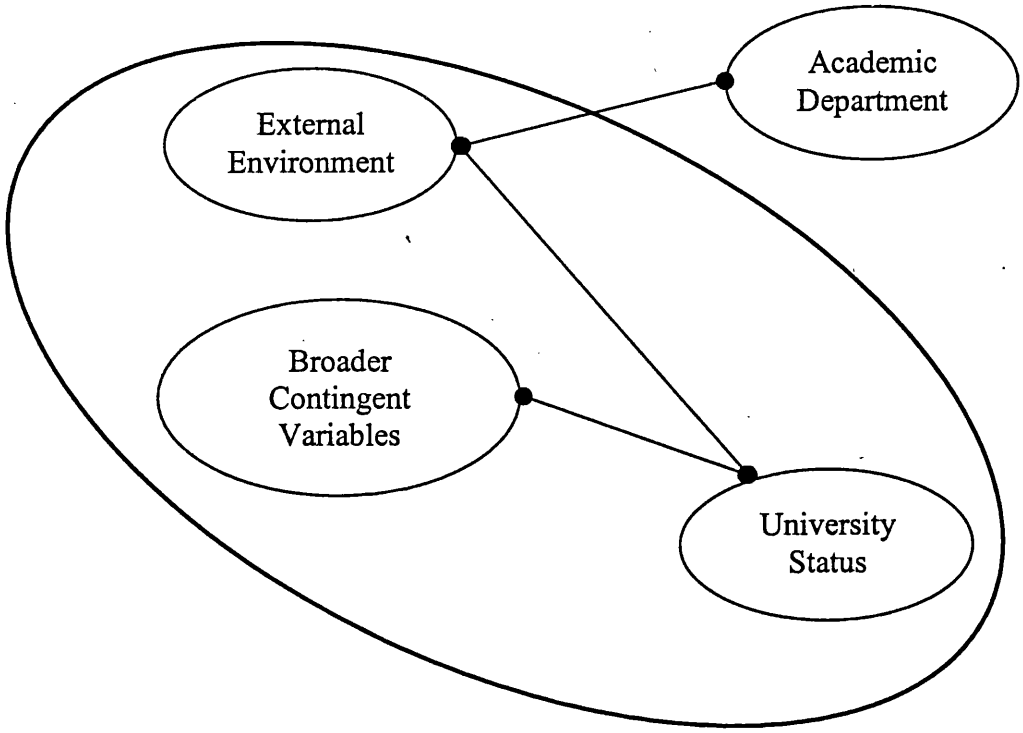
Finally, the academic department (business or non-business) was only statistically significant in the initial MDS analysis (Chapter Eleven), which considered how the external environment was associated with accounting system changes. The significance of the academic department reduced as the broader contingent variables were analysed

(Chapter Twelve) and it was suggested that one could produce a rank order of importance of contingent variables on the evolution of accounting systems in the UK university sector. Thus it appeared that the internal operational authority of a university was much more of an explanatory theme of accounting system developments and the importance of the academic department type diminished as this theme emerged.

The fact that the academic department was significant when the external environment was considered showed that the two department types had reacted, internally, in a different way to one another to the changes that were being experienced in the external environment. The analysis in Chapter Eleven was unable to collaborate the full findings of Gordon and Miller's (1976) research as the relationships with the accounting system evolution and the specific elements of the environment were not consistent. Thus, whilst the academic department was significant in the early analysis (Chapter Eleven) and then appeared to be less important (Chapter Twelve) would suggest that the external environment is not the driving force behind the evolutionary process of accounting systems in the UK university sector. There were certainly accounting system characteristics that were associated with the changes within the external environment and the academic department was an explanatory factor of that. However, whilst the academic department appeared in a number of dimensions the explanatory power of those dimensions accounted for approximately 30% of the relationships in the data (Factors 2,3 and 4 – see Chapter Eleven; Cinca *et al*, 1999). Furthermore, if one follows the argument that the broader contingent variables (particularly the operating authority) dominates the contingent explanatory power then it is not surprising that the academic department failed to appear as significant in the latter analysis.

Figure 14.1 summaries the statistically significant relationships between the academic department and university status ('new' or 'old') in relation to these contingent themes.

Figure 14.1: Academic department and university status as significant variables



14.3 Limitations of this research

This research has depended on two main approaches for its progress; a detailed case study analysis and a rigorous statistical analysis of changes that took place within the UK university sector during the 1990s. The section that follows considers the main issues that may pose a limitation of the findings and interpretation that has taken place.

The core issue relating to the case study is the lack of generalisability that is available from the conclusions (Laughlin, 1996), however those that were generalisable were identified separately to those that were specific to the University.

The interpretation of the second section of the thesis could however, present some issues of general application and interpretation

14.3.1 Measurement of the external environment

The initial questions of the questionnaire were created to measure the extent to which the external environment had impacted upon universities along the lines of Gordon and Miller's (1976) research. In order to collaborate the findings of this research with that of Gordon and Miller the external environment had to be segregated into the three distinct elements of dynamism, hostility and heterogeneity. Therefore specific questions had to be developed which measured these areas individually. This proved impossible to do through a questionnaire (Gordon and Miller, 1976 used case studies) and therefore one could not map the findings from this research exactly to those from Gordon and Miller.

The individual questions that were used to measure the external environment (Appendix 8) were categorised to indicate which area of the external environment was being measured and one could argue that this is a subjective categorisation and open to manipulation. One must remember that research in the social sciences is unlikely to be objective and whilst every effort was made to ensure the questions were measuring the appropriate area of the environment, one could debate the specific areas of some questions.

14.3.2 Questionnaire respondents

The questionnaire required the respondent to recall facts about the university that dated back approximately eight years. The recollection of the specific attributes that were required within the questionnaire would undoubtedly have been difficult. Whilst it is

appreciated that the specific answers to many of these questions may not be totally accurate, the general change over the period would nonetheless become apparent.

14.4 Extension of this research

There is scope for extension of this research through the use of the database of responses that currently exists and a further similar study of accounting system changes within the next two years. This timeframe is important as all universities will be required to report the costs of their core activities (teaching, research and 'other' activities) as a result of the Transparency Review. Therefore it would be interesting to evaluate the impact of the Transparency Review on the evolutionary process of university accounting systems.

Furthermore, it is the conjecture of this thesis that the fundamental reason for the evolution of accounting systems within the 'new' university sector is because of the change agent. Research should be undertaken to identify whether a catalyst for change exists more generally with regards to accounting system developments. Continuing this point, it has been suggested that the omission of the change agent is partially responsible for the 'old' universities accounting systems not evolving in the same manner as the 'new' universities, but more research is required to fully understand this.

Finally, it was mentioned in Chapter Ten that there is further scope to analyse the way in which universities use bottleneck management, as it appeared that a substantial number of institutions had used it to develop teaching and research plans. This research could only identify that it was used, but could not add any further insights into how it had evolved and suggested this was an area for future research.

14.5 Final conclusions

Otley (1980) suggested that there was no one universal accounting system that would meet the objectives of all organisations and a body of contingent literature developed around that. Otley's statement is very general and this research has, *inter alia*, tested the general proposition and suggested that as one delves into a hierarchical structure, from organisations *per se* to a specific sector, then to a specific university and then to the sub-units within a university (academic departments), the general contingent themes become clouded by other factors that are specific to the sector, the university and even the academic department. The net result is that Contingency Theory has a very limited role in explaining the specific evolution of an accounting system within an organisation or department

The research within this thesis has demonstrated the complexity of accounting systems developments in UK universities. The extant Contingency Theory has been thoroughly tested and applied to this sector with new insights being gained which, at a theoretical level suggest an ordering of contingent factors that impinge upon accounting system developments and also suggest that the university sector cannot be considered holistically as regards the evolution of accounting systems. There have been many developments and changes over the decade that has been researched and this comprehensive study has attempted to capture the struggles that have taken place as the accounting systems evolved in the university sector.

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Appendix 1: Higher Education funding cells

Source: HEFCE (1995a)

The eleven subject categories are:

1. Business & Management
2. Science
3. Engineering & Technology
4. Art, Design & Performing Arts
5. Built Environment
6. Subjects & Professions Allied to Medicine
7. Humanities
8. Social Sciences
9. Math. Sciences, IT &Computing
10. Education: Non ITT
11. Clinical & Pre-clinical Subjects

Each of the subjects are further analysed into two levels of study:

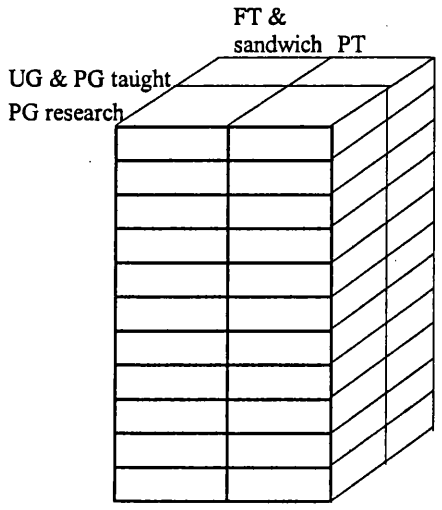
Undergraduate and Post-Graduate taught (UG & PG), and

Post-Graduate research (PG),

and two modes of study:

Full Time (FT) and Sandwich, and

Part Time (PT).



Academic subject categories

The 44 funding cells.

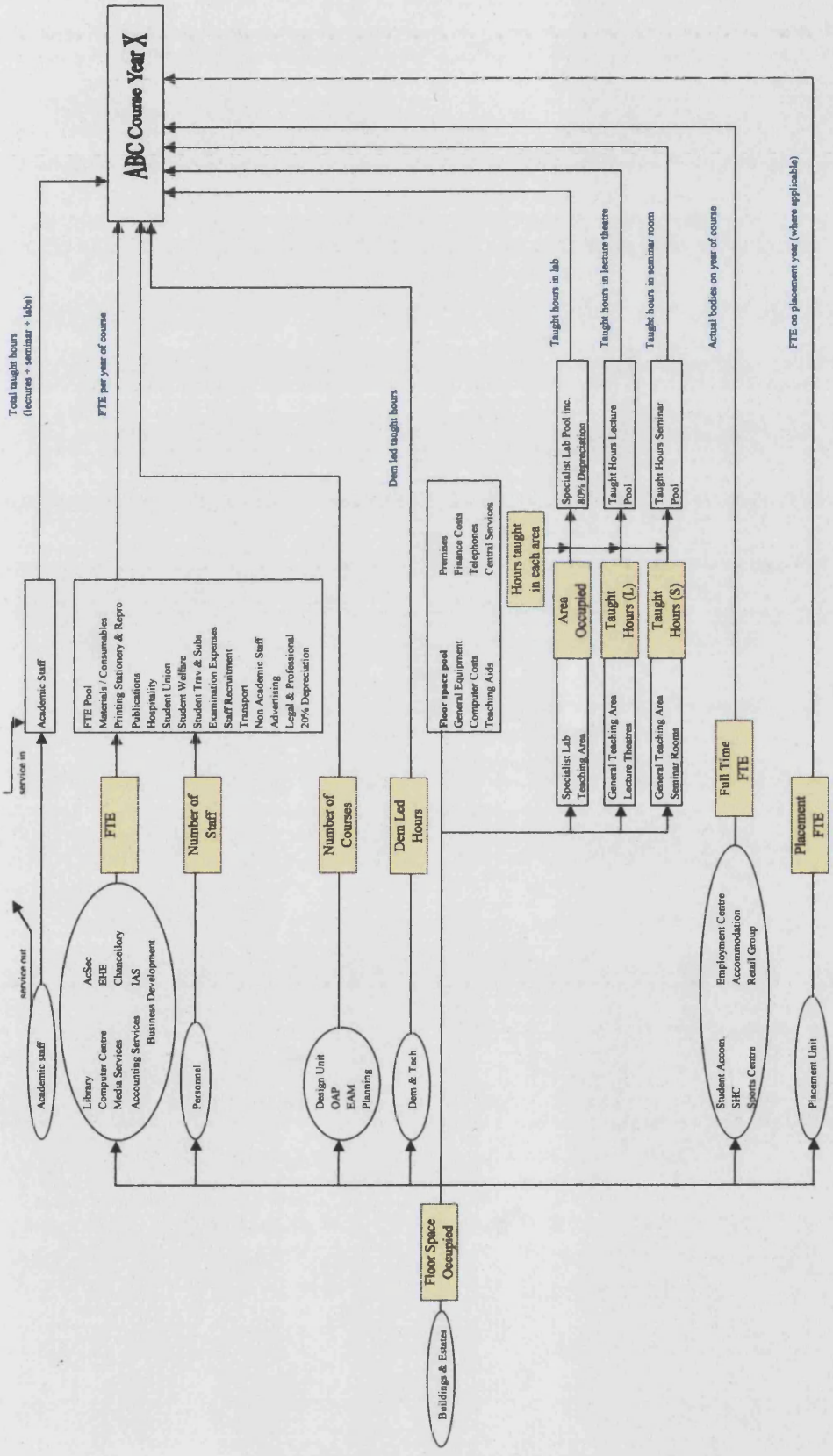
The portfolio of courses on offer will dicatate the amount of funding each institution will obtain from HEFCE.

Appendix 2: Semi-structured interview questions for the University case study

1. Why course costing was developed?
2. Why was course costing replaced by school costing?
3. What went wrong with the ABC model?
4. What were the critical failure factors that affected the implementation of the ABC model?

This small number of questions provided the skeleton to the semi-structured interview, however there were a large number of questions that emerged as a result of issues that arose during the interview itself that cannot be captured here.

Appendix 3: Pictorial overview of the Course Costing Model (CCM)



Given the changes in the Higher Education environment over the last decade which of the following strategies are being pursued by your organisation? (please tick as many as appropriate)

Changes to University Strategy in the last decade

a	New sources of income	☐
b	Changes in ways courses are being delivered through…	
	i. Increased information technology	☐
	ii. Reduction in student contact time	☐
	iii. Consolidating disperate courses	☐
	iv. Increasing student numbers per seminar / tutorial group	☐
	v. Semesterisation	☐
	vi. Modularisation	☐
c	Changes to the balance of courses (income streams)	☐
d	Changing the balance of activity between…	
	i. Academic departments (in terms of the scale of activity)	☐
	ii. Courses (within the academic department and university)	☐
	iii. Research versus Teaching	☐
e	Increased profile of research	☐
f	Major cost reduction initiatives	☐
g	Devolving more responsibility for developing new strategies to the academic department level (within the financial targets set for thedepartment by the university)	☐
h	Colaborative ventures with other universities	☐
I	Franchising of courses	☐
j	Improving the profile of the university within the local geographical area	☐
k	Extending recruitment to new categories of students (overseas, mature, local etc)	☐
l	Trying to achieve economies of scale by contracting out teaching by employing part time staff or consultants	☐
m	Significant improvement in facilities for stakeholders	☐

For the following questions please indicate the degree of change in your University from the early 1990's (more particularly the timeimmediatelypreceding the lifting of the binary divide between Universities and Polytechnics and the explosion in student numbersentering Higher Education) until the present day.

Concerning teaching...

Q2 The range of:-	1	2	3	4	5
i) **undergraduate** courses on offer to students					
ii) **postgraduate** courses on offer to students					
iii) other types, eg. Short courses, bespoke, professional					
iv) electives on **undergraduate** courses for students to select from					
iv) electives on **postgraduate** courses for students to select from					

Concerning research...

Q3 The degree to which research requirements have changed in terms of	1	2	3	4	5
i) Proportion of staff actively undertaking externally funded research					
ii) Proportion of staff actively undertaking research for RAE relevant output					
iii) The demand for research active staff for academic positions within your organisation					

Concerning market research...

		1	2	3	4	5
Q4	The amount of formal developmental market research (as opposed to internal market research for evaluation purposes) undertaken as to:-					
	i) Stakeholders requirements of undergraduate courses					
	ii) Stakeholders requirements of postgraduate courses					
	iii) Identify sources of research funding					
	iv) Identify sources of external funding (e.g. Sponsorship, Venture Capital)					
Q5	The amount of internal market research undertaken as to:-					
	i) Students views of undergraduate courses					
	ii) Students views of postgraduate courses					
	iii) Students requirements of the University					
Q6	The investment in marketing activity					
	i) Undertaken by the university					
	ii) by an external body on behalf of the university					
Q7	The amount of formal evaluation of what other universities are doing in similar areas of:					
	i) Course provision					
	ii) Research					

Q8	Does the university undertake any evaluation of the following areas? (please tick as many as appropriate)	
	a) Student undergraduate profitability analysis	
	b) Student postgraduate profitability analysis	
	c) Course profitability analysis	
	d) Reseach profitability analysis	
	e) Costing of activities	
	f) Cost benefit approach to different forms of marketing	

Concerning operating authority...

With the following questions in this section please indicate the degree of decentralisation to School / Faculty level at around the start of thisdecade andthe position now. Fully centralised indicates that decisions are taken at the top, i.e. Office of the Principle. In the sliding scale,number 1indicates that the University is fully centralised, whereas at the other end of the scale, number 5 indicates the academic department has full authority and responsibility.

	Early 1990's					Position now				
	1	2	3	4	5	1	2	3	4	5
Q9 i) Influence over the appointment of...										
a) Full time academic staff										
b) Part time academic staff										
ii) Influence over appointing administrative staff										
iii) Influence over appointing support services (external to the university)										
iv) Influence over the amount of remission on teaching to academic staff for research / administration										
Q10 Approval to invest in information technology...										
i) For teaching										
ii) For administration										
Q11 Authority to develop and implement new courses...										
i) undergraduate courses										
ii) postgraduate courses										
iii) other types, eg. Short courses, bespoke, professional										
Q12 Approval to allow expenditure on the following type of cost:-										
i) Travel - UK										
ii) Travel - Overseas										
iii) Staff overtime										
iv) Items of capital nature, e.g. information technology										
v) Conferences										
vi) Appointment of a new member of staff										

Q13 If research is becoming more important, has the degree of central support in terms of securing research grants been increased (e.g. setting up a central Research Office)

Yes ☐
No ☐

Q14 Is there any other way in which research activity has either been centralised or decentalised? Please specify...

_____

_____

Concerning revenue and expenditure...

		Early 1990's					Position now				
		1 indicates the Head has no responsibility whereas at the other end of the scale, 5 indicates the Head has full responsibility									
Q15	To what extent is an academic head responsible for ensuring that the department meets financial targets set by the university for the year (in terms of a surplus / deficit / breakeven)?	1	2	3	4	5	1	2	3	4	5

		Early 1990's		Position now	
		Yes	No	Yes	No
Q16	i) Are accounting records kept that identify **revenue** at the academic dept. level				
	ii) Are accounting records kept that identify **expenditure** at the academic dept. level				
	If yes...				
	i) Are expenditure budgets (non pay costs) in existence at the academic dept. level				
	ii) Is the transfer of budget funds between budget heading permitted (i.e. Virement)				
	iii) Are staff budgets (pay costs) in existence at the academic dept. level				
	iv) Does the academic dept. have considerable influence in the budget setting process				
Q17	Are the overheads of the University allocated to the academic dept. level				
	If yes...				
	i. Has the allocation method of these overheads changed over the time period				
Q18	i) Is the academic dept. more conscious of the direct costs[*1] it incurs now				
	ii) Is the academic dept. more conscious of the full costs[*2] it incurs now				
Q19	Is income from teaching related activities allocated to the academic dept.				
	If yes, is this in accordance with the HEFCE funding model?				
	Is income from research grants allocated to the academic dept.				
Q20	Does the centralised accounting function within the University provide financial information concerning:-				
	the **direct** costs[*3] of **teaching**				
	the **direct** costs of **research**				
	the **full** costs[*4] of **teaching**				
	the **full** costs of **research**				
	If yes to any parts of Q20...				
	Is this information available at the academic dept. level?				

Concerning the next two questions, if the answer is yes, please also indicate the degree of change / additional resources by tickingthe appropriate box.

Q21 Has there been a change in the proportion of academic time taken up through financial management in the academic department?

Yes ☐
No ☐

significant decrease	moderate decrease	no change	moderate increase	significant increase
☐	☐	☐	☐	☐

Q22 Has the academic department had to allocate additional resources (administrative or academic) as a direct result of the requirement to be responsible for financial targets set by the university for the department?

Yes ☐
No ☐

significant decrease	moderate decrease	no change	moderate increase	significant increase
☐	☐	☐	☐	☐

Concerning the Accounting Information System

	Early 1990's		Position now	
	Yes	No	Yes	No
Q23 i) showing costs incurred on each course	☐	☐	☐	☐
ii) showing costs incurred on each research project	☐	☐	☐	☐
Q24 Is the central accounting function prepared to create accouting reports in a format the academic department requires (if different from standard)?	☐	☐	☐	☐

Please indicate briefly the type of bespoke report...

Q25 Is it possible to interrogate central accounting reports in order to produce reports other than standard?

Yes	No	Yes	No
☐	☐	☐	☐

Please indicate briefly the type of bespoke report...

Q26 Do academic departments keep records of revenues and costs of: -

i) Undergraduate courses

ii) Postgraduate courses

iii) Research activity

iv) Other activities

If yes...

a) is this different to that produced by the centre?

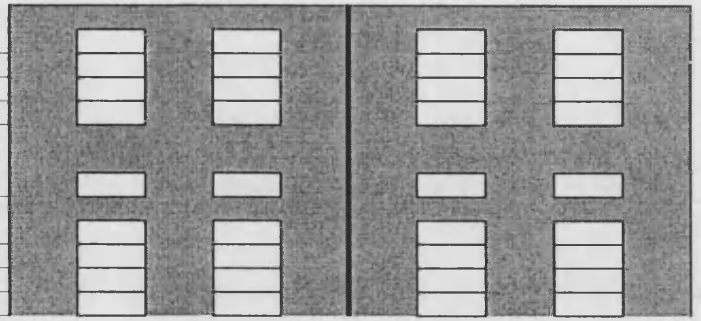
b) is this using: - (please tick as many as appropriate)

i) Spreadsheets

ii) Other database, e.g. Access

iii) Specialised accounting software

iv) Paper records

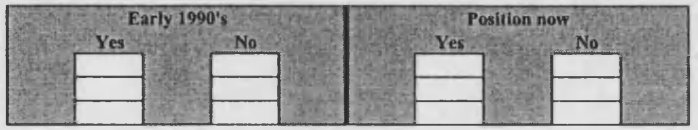


Q27 Has the financial gearing of the university increased over the past decade

Q28 Does the central accounting function provide the only support in appraising projects that require resources?

i) Were these appraisals undertaken largely by analysing costs only?

ii) Or, did they include a detailed analysis of the incremental income streams?



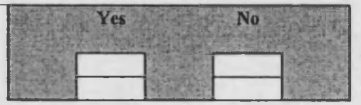
Q29 a) Within your University do you consider there are any bottlenecks that prevent growth?

If so are these...

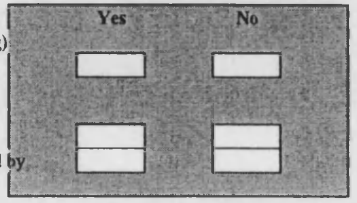
i) Staff time
ii) Staff availability of adequate standard
iii) Room availability
iv) Timetabling
v) Insufficient demand from well qualified students
vi) Budgetary constraints
Other (please specify)

b) Have any of these bottlenecks led to a proactive plan being developed in terms of the level of...

i) Teaching
ii) Research



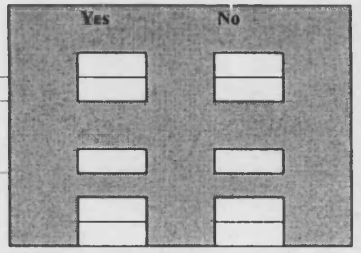
Q30 In relation to concepts such as target pricing and target costing, has the University ever gone through a formal method of cost reduction to enable a specific opportunity (research or teaching) to generate a profit?



If 'yes', what method was employed to reduce these costs...

i) Fromal analysis of changing the profile of the activity
ii) Reducing costs of elements of the activity that were perceived to have little value added by the student/ consumer.
Other (please specify)

Concerning budgetary devolution



Q31 a) Is there general acceptance that budgetary devolution has been successful

b) Has there been any subsequent move to recentralise this budgetary devolution

Q32 If budgetary devolution has taken place to the aademic department, have transfer pricing policies been developed (e.g. concerning payment for service teaching)

If yes...

i) Has there been any problems with their introduction?
ii) Has this resulted in changes to the way courses are delivered?

If yes to either Q32 (i) or (ii) please specify

For the following questions please indicate the degree of change in your University from the early 1990's (more particularly the time immediately preceding the lifting of the binary divide between Universities and Polytechnics and the explosion in student numbers entering Higher Education) until the present day.

Concerning teaching...

		1 indicates no change at all 5 indicates dramatic change				
		1	2	3	4	5
Q1	The way in which the delivery of course content has changed on:-					
	i) undergraduate courses					
	ii) postgraduate courses					

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Q2	The amount of information technology that is used to deliver content to students on:-					
	i) undergraduate courses					
	ii) postgraduate courses					

If there has been change in the amount of IT used, has there been any financial analysis of the costs versus benefits of this?

Yes ☐
No ☐

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Q3	The entry details of students in terms of					
	i) 'A' Level points for undergraduates					
	ii) Age profile of:-					
	a) Undergraduates					
	b) Postgraduates					
	iii) Geographic catchment area of:-					
	a) Undergraduates					
	b). Postgraduates					
	iv) Application rate for places on:-					
	a) Undergraduate courses					
	b) Postgraduate courses					

Q4 The financial incentives offered to students to study on:-	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) undergraduate courses					
ii) postgraduate courses					

If there has been a change in the financial incentives given to students, what is the perceived (or actual) benefit of doing this? (please tick as many as appropriate)

i) Attract better students	
ii) To recruit to certain types of courses	
iii) Benefits greater than the costs	
iv) Other (please specify)	

Q5 The range of:-	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) **undergraduate** courses on offer to students					
ii) **postgraduate** courses on offer to students					
iii) other types, eg. Short courses, bespoke, professional					
iv) electives on **undergraduate** courses for students to select from					
iv) electives on **postgraduate** courses for students to select from					

Concerning research...

Q6 The degree to which research requirements have changed in terms of	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) Proportion of staff actively undertaking externally funded research					
ii) Proportion of staff actively undertaking research for RAE relevant output					
iii) Students registering for research...					
a) Age profile					
b) Number					
c) Financial incentives being offered					
iv) The demand for research active staff for academic positions within your organisation					

Concerning market research...

Q7 The amount of formal developmental market research (as opposed to internal market research for evaluation purposes) undertaken as to:-

	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) Stakeholders requirements of undergraduate courses					
ii) Stakeholders requirements of postgraduate courses					
iii) Identify sources of research funding					
iv) Identify sources of external funding (e.g. Sponsorship, Venture Capital)					

Q8 The amount of internal market research undertaken as to:-

	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) Students views of undergraduate courses					
ii) Students views of postgraduate courses					
iii) Students requirements of the University					

Q9 The investment in marketing activity

	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) Undertaken by the university					
ii) by an external body on behalf of the university					

Q10 The amount of formal evaluation of what other universities are doing in similar areas of:

	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) Course provision					
ii) Research					

Q11 To what extent has this market research had an impact in determining the degree of change indicated in questions 1 through 5 ?

significant decrease	moderate decrease	no change	moderate increase	significant increase

Q12 Does the university undertake any evaluation of the following areas? (please tick as many as appropriate)

a) Student undergraduate profitability analysis	
b) Student postgraduate profitability analysis	
c) Course profitability analysis	
d) Reseach profitability analysis	
e) Costing of activities	
f) Cost benefit approach to different forms of marketing	

Concerning operating authority...

With the following questions in this section please indicate the degree of decentralisation to School / Faculty level at around the start of this decade andthe position now. Fully centralised indicates that decisions are taken at the top, i.e. Office of the Principle. In the sliding scale, number 1indicates that the University is fully centralised, whereas at the other end of the scale, number 5 indicates the academic department hasfull authority and responsibility.

	Early 1990's					Position now				
	1	2	3	4	5	1	2	3	4	5
Q13 i) Influence over the appointment of...										
a) Full time academic staff										
b) Part time academic staff										
ii) Influence over appointing administrative staff										
iii) Influence over appointing support services (external to the university)										
iv) Influence over the amount of remission on teaching to academic staff for research / administration										

	1	2	3	4	5	1	2	3	4	5
Q14 Approval to invest in information technology...										
i) For academic activities										
ii) For administration										

	1	2	3	4	5	1	2	3	4	5
Q15 Authority to develop and implement new courses...										
i) undergraduate courses										
ii) postgraduate courses										
iii) other types, eg. Short courses, bespoke, professional										

	1	2	3	4	5	1	2	3	4	5
Q16 Approval to allow expenditure on the following type of cost:-										
i) Travel - UK										
ii) Travel - Overseas										
iii) Staff overtime										
iv) Items of capital nature, e.g. information technology										
v) Conferences										
vi) Appointment of a new member of staff										

Q17 If research is becoming more important, has the degree of central support in terms of securing research grants been increased (e.g. setting up a central Research Office)

Yes ☐
No ☐

Q18 Is there any other way in which research activity has either been centralised or decentalised? Please specify...

_____

_____

Concerning revenue and expenditure...

Q19 To what extent is an academic head responsible for ensuring that the department meets financial targets set by the university for the year (in terms of a surplus / deficit / breakeven)?

1 indicates the Head has no responsibility whereas at the other end of the scale, 5 indicates the Head has full responsibility

	Early 1990's					Position now				
	1	2	3	4	5	1	2	3	4	5

	Early 1990's		Position now	
	Yes	No	Yes	No
Q20 i) Are accounting records kept that identify **revenue** at the academic dept. level				
ii) Are accounting records kept that identify **expenditure** at the academic dept. level				
If yes...				
i) Are expenditure budgets (non pay costs) in existence at the academic dept. level				
ii) Is the transfer of budget funds between budget heading permitted (i.e. Virement)				
iii) Are staff budgets (pay costs) in existence at the academic dept. level				
iv) Does the academic dept. have considerable influence in the budget setting process				

Q21 Are the overheads of the University allocated to the academic dept. level

If yes...

i. Has the allocation method of these overheads changed over the time period

Q22 i) Is the academic dept. more conscious of the **direct costs**[*1] it incurs now

ii) Is the academic dept. more conscious of the **full costs**[*2] it incurs now

Q23 Is income from teaching related activities allocated to the academic dept.

Is income from research grants allocated to the academic dept.

Q24 Does the centralised accounting function within the University provide financial information concerning:-

the **direct** costs[*3] of **teaching**

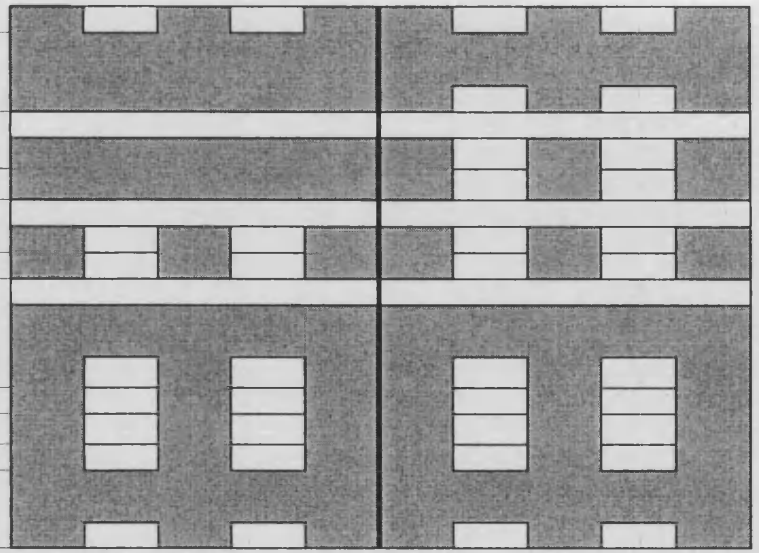
the **direct** costs of **research**

the **full** costs[*4] of **teaching**

the **full** costs of **research**

If yes to any parts of Q24...

Is this information available at the academic dept. level?



Concerning the next two questions, if the answer is yes, please also indicate the degree of change / additional resources by ticking the appropriate box in the range 1 - 5. 1 indicates no changes, whereas 5 indicates substantial change.

Q25 Has there been a change in the proportion of academic time taken up through financial management in the academic department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes						
No						

Q26 Has the academic department had to allocate additional resources (administrative or academic) as a direct result of the requirement to be responsible for financial targets set by the university for the department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes						
No						

Concerning the Accounting Information System

	Early 1990's		Position now	
	Yes	No	Yes	No
i) showing costs incurred on each course				
ii) showing costs incurred on each research project				

Q27 Is it possible to access accounting reports from the centralised accounting records at the academic department level…

Q28 Is the central accounting function prepared to create accouting reports in a format the academic department requires (if different from standard)?

Please indicate briefly the type of bespoke report…

Q29 Is it possible to interrogate central accounting reports in order to produce reports other than standard?

Please indicate briefly the type of bespoke report…

	Early 1990's		Position now	
	Yes	No	Yes	No
Q30 Do academic departments keep records of revenues and costs of: -				
i) Undergraduate courses	☐	☐	☐	☐
ii) Postgraduate courses	☐	☐	☐	☐
iii) Research activity	☐	☐	☐	☐
iv) Other activities	☐	☐	☐	☐
If yes…				
a) is this different to that produced by the centre?	☐	☐	☐	☐
b) is this using: - (please tick as many as appropriate)				
i) Spreadsheets	☐	☐	☐	☐
ii) Other database, e.g. Access	☐	☐	☐	☐
iii) Specialised accounting software	☐	☐	☐	☐
iv) Paper records	☐	☐	☐	☐
Q31 a) Are the costs of financial incentives that are offered to students (Q4) clearly identified in the costing system at the…				
i. University level	☐	☐	☐	☐
ii. Academic department level	☐	☐	☐	☐
iii. Course level	☐	☐	☐	☐
b) Is the effectiveness of these financial incentives reviewed at least annually?	☐	☐	☐	☐

Q32 a) Within your University do you consider there are any bottlenecks that prevent growth?

If so are these…

- i) Staff time ☐
- ii) Staff availability of adequate standard ☐
- iii) Room availability ☐
- iv) Timetabling ☐
- v) Insufficient demand from well qualified students ☐
- vi) Budgetary constraints ☐

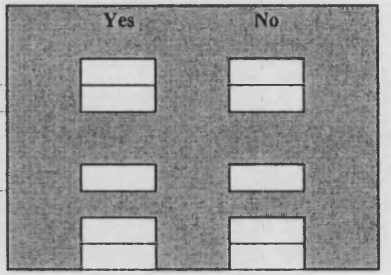
Other (please specify)

_____

_____

	Yes	No
b) Have any of these bottlenecks led to a proactive plan being developed in terms of the level of…		
i) Teaching	☐	☐
ii) Research	☐	☐

Concerning budgetary devolution



Q33 a) Is there general acceptance that budgetary devolution has been successful

b) Has there been any subsequent move to recentralise this budgetary devolution

Q34 If budgetary devolution has taken place to the aademic department, have transfer pricing policies been developed (e.g. concerning payment for service teaching)

If yes...

i) Has there been any problems with their introduction?

ii) Has this resulted in changes to the way courses are delivered?

If yes to either (i) or (ii) please specify

Appendix 6: Population of UK universities used for questionnaire

Number	University Name	Status
1	Aberdeen University	OLD
2	Abertay Dundee University	NEW
3	Aberystwyth University	OLD
4	Anglia Polytechnic University	NEW
5	Aston University	OLD
6	Bangor, University of Wales	OLD
7	Bath University	OLD
8	Birmingham University	OLD
9	Bournemouth University	NEW
10	Bradford University	OLD
11	BRIGHTON UNIVERSITY	NEW
12	Bristol University	OLD
13	Brunel University	OLD
14	Buckingham University (UCAS 97/98)	OLD
15	Cambridge University	OLD
16	Cardiff, University of Wales	OLD
17	Central England University	NEW
18	Central Lancashire University	OLD
19	City University	OLD
20	Coventry University	NEW
21	Cranfield University (UCAS 97/98)	OLD
22	De Montfort University	NEW
23	Derby University	NEW
24	Dundee University	OLD
25	Durham University	OLD
26	East Anglia University	OLD
27	East London University	NEW
28	Edinburgh University	OLD
29	Essex University	OLD
30	Exeter University	OLD
31	Glamorgan University	NEW
32	Glasgow Caledonian University	NEW
33	Glasgow University	OLD
34	Greenwich University	NEW
35	Herriot-Watt University	OLD
36	Hertfordshire University	NEW
37	Huddersfield University	NEW
38	Hull University	OLD
39	Humberside University	NEW
40	Keele University	OLD
41	Kent at Canterbury University	OLD
42	Kingston University	NEW
43	Lampeter University	OLD
44	Lancaster University	NEW
45	Leeds Metropolitan University	NEW

46	Leeds University	OLD
47	Leicester University	OLD
48	Liverpool John Moores University	NEW
49	Liverpool University	OLD
50	London Guildhall University	NEW
51	London University (LSE)	OLD
52	Loughborough University	OLD
53	Luton University	NEW
54	Manchester Institute of Science and Technology University(UMIST)	OLD
55	Manchester Metropolitan University	NEW
56	Manchester University	OLD
57	Middlesex University	NEW
58	Napier University	NEW
59	Newcastle upon Tyne University	OLD
60	North London University	NEW
61	Northumbria at Newcastle University	NEW
62	Nottingham Trent University	NEW
63	Nottingham University	OLD
64	Open University	OLD
65	Oxford Brookes University	NEW
66	Oxford University	OLD
67	Paisley University	NEW
68	Plymouth University	NEW
69	Portsmouth University	NEW
70	Queen's University of Belfast	OLD
71	Reading University	OLD
72	Robert Gordon University	NEW
73	Salford University	OLD
74	Sheffield Hallam University	NEW
75	Sheffield University	OLD
76	South Bank University	NEW
77	Southampton University	OLD
78	St Andrews University	OLD
79	Staffordshire University	NEW
80	Stirling University	OLD
81	Strathclyde University	OLD
82	Sunderland University	NEW
83	Surrey University	OLD
84	Sussex University	OLD
85	Swansea University	OLD
86	Teeside University	NEW
87	Thames Valley University	NEW
88	Ulster University	OLD
89	Warwick University	OLD
90	West of England University	NEW
91	Westminster University	NEW
92	Wolverhampton University	NEW
93	York University	OLD

Appendix 7: Former polytechnics change of details to universities

Source: Gray and Helliar, 1994

Polytechnic name	University name
Anglia Polytechnic	Anglia Polytechnic University
Birmingham Polytechnic	Central England University
Bournemouth Polytechnic	Bournemouth University
Brighton Polytechnic	Brighton University
Bristol Polytechnic	West of England University
Central London Polytechnic	Westminster University
City of London Polytechnic	London Guildhall University
Coventry Poly	Coventry University
Derbyshire College of Higher Education	Derby University
Dundee Institute of Technology	Abertay Dundee University
East London Polytechnic	East London University
Glasgow Polytechnic	Glasgow Caledonian University
Hatfield Polytechnic	Hertfordshire University
Huddersfield Polytechnic	Huddersfield University
Humberside Business School	Humberside University
Kingston Polytechnic	Kingston University
Lancaster Polytechnic	Lancaster University
Leeds Polytechnic	Leeds Metropolitan University
Leicester Polytechnic	De Montfort University
Liverpool Polytechnic	Liverpool John Moores University
Luton College of Higher Education	Luton University
Manchester Polytechnic	Manchester Metropolitan University
Middlesex Polytechnic	Middlesex University
Napier Polytechnic	Napier University
Newcastle Polytechnic	Northumbria at Newcastle University
North London Polytechnic	North London University
Nottingham Polytechnic	Nottingham Trent University
Oxford Polytechnic	Oxford Brookes University
Paisley College	Paisley University
Portsmouth Polytechnic	Portsmouth University
Robert Gordon Institute of Technology	Robert Gordon University
Sheffield City Polytechnic	Sheffield Hallam University
South Bank Poly	South Bank University
South West Polytechnic	Plymouth University
Staffordshire Polytechnic	Staffordshire University
Sunderland Polytechnic	Sunderland University
Teeside Polytechnic	Teeside University
Thames Polytechnic	Greenwich University
Wales Polytechnic	Glamorgan University
West London Polytechnic	Thames Valley University
Wolverhampton Polytechnic	Wolverhampton University

Appendix 8: Questions measuring elements of the external environment (dynamism, heterogeneity and hostility)

Dynamism[1]	Heterogeneity[2]	Hostility[3]	
			Concerning teaching...
			Q1 The way in which the delivery of course content has changed on:-
X	X		i) undergraduate courses
X	X		ii) postgraduate courses
			Q2 The amount of information technology that is used to deliver content to students on:-
X	X		i) undergraduate courses
X	X		ii) postgraduate courses
			If there has been change in the amount of IT used, has there been any financial analysis of the costs versus benefits of this?
			Q3 The entry details of students in terms of
X	X	X	i) 'A' Level points for undergraduates
			ii) Age profile of:-
X	X		a) Undergraduates
X	X		b) Postgraduates
			iii) Geographic catchment area of:-
X	X		a) Undergraduates
X	X		b). Postgraduates
			iv) Application rate for places on:-
X	X	X	a) Undergraduate courses
X	X	X	b) Postgraduate courses
			Q4 The financial incentives offered to students to study on:-
X	X	X	i) undergraduate courses
X	X	X	ii) postgraduate courses
			If there has been a change in the financial incentives given to students, what is the perceived (or actual) benefit of doing this? (please tick as many as appropriate)
			i) Attract better students
			ii) To recruit to certain types of courses
			iii) Benefits greater than the costs
			iv) Other (please specify)
			Q5 The range of:-
X		X	i) **undergraduate** courses on offer to students
X		X	ii) **postgraduate** courses on offer to students
X		X	iii) other types, eg. Short courses, bespoke, professional
X		X	iv) electives on **undergraduate** courses for students to select from
X		X	iv) electives on **postgraduate** courses for students to select from
			Concerning research...
			Q6 The degree to which research requirements have changed in terms of
X	X	X	i) Proportion of staff actively undertaking externally funded research
X	X	X	ii) Proportion of staff actively undertaking research for RAE relevant output
			iii) Students registering for research...
X	X		a) Age profile
X	X		b) Number
X	X	X	c) Financial incentives being offered
X	X	X	iv) The demand for research active staff for academic positions within your organisation

Definition of Terms (Gordon and Miller, 1976)

1 Dynamism: the amount and unpredictability of change in consumer tastes, production or service technologies, and the modes of competition in the firm's principle activities.

2 Heterogeneity: the differences in competitive tactics, consumer tastes, product lines, channels of distribution, etc. across the firm's respective markets

3 Hostility: evidenced by price, product, technological and distribution competition, severe regulatory restrictions, shortages of labour or raw materials, and unfavourable demographic trends.

Appendix 9a: Covering letter sent with questionnaire

Dear

PhD Research

I am writing to you in connection with my ongoing PhD research into the development of management accounting information systems within the UK University sector.

There is a significant amount of activity in this area at the present from various parties, but little from the academic community undertaking PhD research. Please could I therefore, request that you take the time to complete the enclosed questionnaire, so that this research can add to the increasing need for the development of an effective management accounting information system that meets the needs of Universities.

This questionnaire is the culmination of about four years of (part time) work, under the supervision of Professor Cyril Tomkins at Bath University, into the changes affecting UK Universities and how management accounting needs have changed and are changing. The final analysis of this research could provide tangible benefits to the University sector. However, in order to achieve that objective I need to ensure these questionnaires are completed and returned.

Please note that the questionnaire refers to the 'academic department', but please use the term 'faculty' or 'school' in place of 'department' if that is more appropriate for your institution.

I sincerely hope that you can spare the time and look forward to receiving the completed questionnaire in due course. Naturally all data will be kept entirely confidential to this research and specific references to individuals or organisations will not be made.

Yours faithfully,

Appendix 9b: Follow up letter sent to increase responses from questionnaire

Dear

PhD Research

I am writing to you in connection with my ongoing PhD research into the development of management accounting information systems in the UK University sector.

In June this year you would have received a questionnaire and a letter from myself asking for your assistance in relation to my research. Whilst I do appreciate this is a very busy time for you, could I please ask again that you take some time to complete the enclosed questionnaire.

I have had some responses from the sector so far, but not enough to make the analysis worthwhile and therefore I would seek about 15 minutes of your time to help to make a difference.

I sincerely look forward to hearing from you in the near future.

Thank you.

Yours sincerely,

Appendix 10: Tree diagram of total survey error

Source: Zikmund, 1997

Error coloured in yellow has been idenified as relevant to this research
Error coloured in green has been idenified as not relevant to this research

Glossary to Terminology

Random Sampling Error. Errors that occur through bias in the sampling basis.

Systematic Error (bias). This error results from the fact the research design and administration is not perfect.

Respondent Error. Non response error (or non-ignorable non response) has been explained in Chapter Eight. ***Response bias*** occurs when those responding to the questionnaire seek to misrepresent the truth as they see it. This could be ***deliberate*** or ***unconscious.*** Such misrepresentation can be classified into five sections:-

1. ***Acquiescence bias.*** Such respondents will always agree or disagree with the statements they are posed.
2. ***Extremity bias.*** Such respondents will either use extremes or respond neutral to statements they are posed.
3. ***Interviewer bias.*** As there will not be an interviewer present during the mail questionnaires then this bias will not be relevant, however the presence of such a person could influence the responses.
4. ***Auspices bias.*** The organisation responsible for the research could influence the responses. For example a student's union undertaking research on the imposition of student fees. In this research it is unlikely that the author would be in a position to influence the outcomes of questionnaires.
5. ***Social Desirability bias.*** There is little chance of this occurring in this research. Respondents would seek to create a favourable impression with the researcher, but as the researcher will not be present then this is unlikely to occur.

Administrative Error. Such errors occur as the administration of the research is not perfect. It could be possible to incorrectly enter some data into the statistical computer package creating a ***data processing error.***

Sample Selection Error. If the population from which the sample was selected was not complete then this error could occur, or the sample selection method itself could be prone to bias.

The final two errors of ***interviewer error*** and ***interviewer cheating*** could occur, however these have not occurred in this research.

Appendix 11: Eigenvalues

The eigenvalue should be considered in relation to the amount of explanation that is provided by one further Factor. It is logical to suggest that as the number of variables increases then the eigenvalues will result in less percentage being explained by the individual Factor; this can be seen by comparing Appendix 21 with Appendix 29. Appendix 21 analyses 24 variables and as can be seen an eigenvalue of 0.9737 on Factor 9 explains 4.06% of the relationship. Contrasting this with Appendix 29, which analyses 70 variables, an eigenvalue of 0.9295 on Factor 17 only explains 1.33% of the relationship. Whilst the eigenvalue is important, one should not lose sight of the amount of explanation that is provided by the additional Factor.

Appendix 12: Correcting missing data

It was noted in Chapter Eight that the person who was completing the questionnaire may not have been in the same position for the complete period of the study and this might cause a problem with recalling data that was being asked for the early 1990s period. Therefore some missing data was expected, so this had to be carefully managed to prevent skewing the analysis.

It was necessary to estimate the missing data as the statistical techniques that were to be used required a complete dataset. If there was just one piece of missing data for a responding academic department/ university (termed case) then the whole case would have been ignored and thus the number of cases from which the analysis was completed would have been reduced. Missing data was therefore corrected in question numbers 1 through to 19, as the Factor Analysis and Multi-Dimensional Scaling was performed on these questions. Therefore it was important to rectify this without invalidating the dataset.

There were three choices to be made concerning the missing data and that was whether to replace no data with the variable '3' (indicating no change), replace it with the average response of all the responses for an individual question (variable) or replace it with the average response of the individual department category (for the academic department questionnaire) or the university (for the general management questionnaire).

As the missing data was not substantial then adding such data should not invalidate the dataset but the choice of how to add deal with the missing data may skew the dataset. By way of an example of the degree of missing data, there were 62 elements missing

out of 1248 (4.97%) in questions 1 through 6 of the two academic department questionnaires

The first choice was discounted as early indications showed that the responses to certain questions were not evenly distributed around the '3' variable and this would have distorted the dataset. To determine the most appropriate method of dealing with the missing data out of the remaining choices the data had to be manipulated with the missing data remaining and then with the two alternative means of data correction. This data manipulation was performed using Factor Analysis to see if there was a significant change in the ordering and weighting of the Factors when the missing data was added. The addition of averaged data for both academic departments together did distort the Factor Analysis whereas when correcting the data using the average for the business department and average for the non-business department separately the distortion was not so significant. Therefore the third approach was used to correct the missing data, which was demonstrated not to skew or invalidate the full dataset.

Appendix 13: Accounting system variable recoded to 'change' over the period of the research.

Many of the questions in the 'revenue and expenditure' and 'accounting information system' sections posed Yes/ No questions relating to the early 1990s and 1999. The way in which the answers to these questions were to be analysed required them to be indicating whether change had occurred in the accounting systems over time. The contingent variables in the earlier sections of the questionnaire were all measuring change and therefore the association of these contingent variables with accounting system change was fundamental.

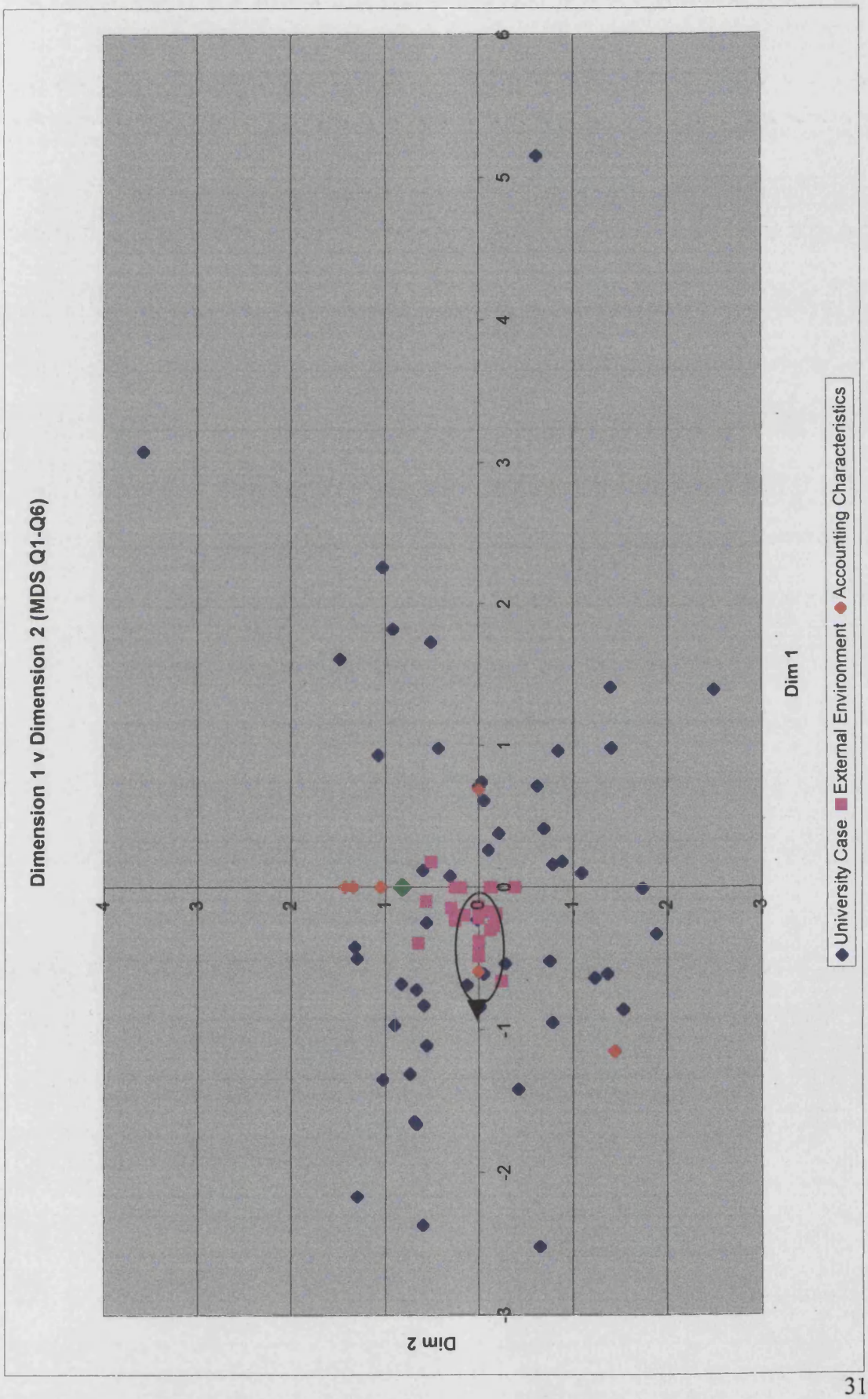
Question numbers 20, 21(i), 23, 24, 27, 28, 29, 30 and 31 (academic department questionnaire and comparable questions on the general university management questionnaire) were all exported to an Excel spreadsheet where they were scrutinised for any changes that had occurred. Each of these questions had a response for the early 1990s and a response for 1999 and the current SPSS coding was that if the response was No it had been given a 2 code and it was Yes it had been given a 1 code. Therefore it was possible to indicate if change had occurred (i.e. moving from 2 to 1 over the period of the study). All the responses for each academic department and each general management questionnaire were subject to a simple formula in Excel, the outcome of which was pasted back into SPSS to allow the binary logistic regression to be performed.

A list of all the questions that were reanalysed is provided below: -

- q20i.90, q20i.99 into Q20i-c: Change in Accounting records to identify revenue at the academic dept. level over time
- q20ii.90, q20ii.99 into Q20ii-c: Change in Accounting records to identify expenditure at the academic dept. level over time
- q20bi.90, q20bi.99 into Q20bii-c: Change in non pay budgets existence over time
- q20bii.90, q20bii.99 into Q20biv-c: Change in virement over time
- q20biii.90, q20biii.99 into Q20bi-c: Change in staff budgets existence over time
- q20biv.90, q20biv.99 into Q20biii-c: Change in influence over time
- q21a.90, q21a.99 into Q21a-c: Change in overhead allocation to dept over time
- q23i.90, q23i.99 into Q23i-c: Change in income (teaching) allocation to dept over time
- q23ii.90, q23ii.99 into Q23ii-c: Change in income (research) allocation to dept over time
- q24i.90, q24i.99 into Q24i-c: Change in financial info provide by centre (direct costs of teaching)
- q24ii.90, q24ii.99 into Q24ii-c: Change in financial info provide by centre (direct costs of research)
- q24iii.90, q24iii.99 into Q24iii-c: Change in financial info provide by centre (indirect costs of teaching)
- q24iv.90, q24iv.99 into Q24iv-c: Change in financial info provide by centre (indirect costs of research)
- q24v.90, q24v.99 into Q24v-c: Change in info being available at dept level
- q27i.90, q27i.99 into Q27i-c: Change in access of acc reports for course costs
- q27ii.90, q27ii.99 into Q27ii-c: Change in access of acc reports for research projects
- q28.90. q28.99 into Q28-c: Change in ability of acc reports to be customised
- q29.90, q29.99 into Q29-c Change in ability to interrogate central acc reports to customise
- q30ai.90, q30ai.99 into Q30ai-c: Change in records (rev & costs) kept at dept level of ug courses
- q30aii.90, q30aii.99 into Q30aii-c: Change in records (rev & costs) kept at dept level of pg courses
- q30aiii.90, q30aiii.99 into Q30aiii-c: Change in records (rev & costs) kept at dept level of research activity
- q30aiv.99, q30aiv.99 into Q30aiv-c: Change in records (rev & costs) kept at dept level of other activity

- q31ai.90, q31ai.99 into Q31ai-c: Change in identification of financial incentives (Q4) at Uni level
- q31aii.90, q31aii.99 into Q31aii-c: Change in identification of financial incentives (Q4) at Dept level
- q31aiii.90, q31aiii.99 into Q31aiii-c: Change in identification of financial incentives (Q4) at course level
- q31b.90, q31b.99 into Q31b-c: Change in review of the effectiveness of these financial incentives on an annual basis

Appendix 14: Example of MDS interpretation



For the following questions please indicate the degree of change in your University from the early 1990's (more particularly the time immediately preceding the lifting of the binary divide between Universities and Polytechnics and the explosion in student numbers entering Higher Education) until the present day.

Concerning teaching...

		1 indicates no change at all 5 indicates dramatic change				
		1	2	3	4	5
Q1	The way in which the delivery of course content has changed on:-					
	i) undergraduate courses	2	4	10	12	3
	ii) postgraduate courses	3	7	12	7	1

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Q2	The amount of information technology that is used to deliver content to students on:-					
	i) undergraduate courses	0	1	1	22	7
	ii) postgraduate courses	0	0	9	18	2

If there has been change in the amount of IT used, has there been any financial analysis of the costs versus benefits of this?	*Yes*	3
	No	27

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Q3	The entry details of students in terms of					
	i) 'A' Level points for undergraduates	0	9	9	11	1
	ii) Age profile of:-					
	a) Undergraduates	0	2	18	11	0
	b) Postgraduates	0	2	24	3	0
	iii) Geographic catchment area of:-					
	a) Undergraduates	2	6	17	3	2
	b). Postgraduates	0	1	11	9	6
	iv) Application rate for places on:-					
	a) Undergraduate courses	2	7	7	11	4
	b) Postgraduate courses	0	3	7	14	6

Q4 The financial incentives offered to students to study on:-	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) undergraduate courses	3	3	20	2	1
ii) postgraduate courses	0	4	19	5	1

If there has been a change in the financial incentives given to students, what is the perceived (or actual) benefit of doing this? (please tick as many as appropriate)

i) Attract better students	3
ii) To recruit to certain types of courses	3
iii) Benefits greater than the costs	2
iv) Other (please specify)	

Q5 The range of:-	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) **undergraduate** courses on offer to students	0	2	3	16	10
ii) **postgraduate** courses on offer to students	0	1	3	12	15
iii) other types, eg. Short courses, bespoke, professional	0	2	9	10	5
iv) electives on **undergraduate** courses for students to select from	2	3	4	13	9
iv) electives on **postgraduate** courses for students to select from	1	1	5	16	7

Concerning research...

Q6 The degree to which research requirements have changed in terms of	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) Proportion of staff actively undertaking externally funded research	1	1	7	16	6
ii) Proportion of staff actively undertaking research for RAE relevant output	1	0	6	16	8
iii) Students registering for research...					
a) Age profile	0	0	26	2	1
b) Number	0	1	8	16	4
c) Financial incentives being offered	0	1	18	8	1
iv) The demand for research active staff for academic positions within your organisation	0	0	9	7	15

Concerning market research...

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q7 The amount of formal developmental market research (as opposed to internal market research for evaluation purposes) undertaken as to:-					
i) Stakeholders requirements of undergraduate courses	0	0	15	11	3
ii) Stakeholders requirements of postgraduate courses	0	0	14	12	3
iii) Identify sources of research funding	0	0	10	10	9
iv) Identify sources of external funding (e.g. Sponsorship, Venture Capital)	0	0	13	11	5

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q8 The amount of internal market research undertaken as to:-					
i) Students views of undergraduate courses	0	0	2	14	14
ii) Students views of postgraduate courses	0	0	3	15	10
iii) Students requirements of the University	0	0	5	14	9

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q9 The investment in marketing activity					
i) Undertaken by the university	0	0	0	19	9
ii) by an external body on behalf of the university	0	0	20	4	2

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q10 The amount of formal evaluation of what other universities are doing in similar areas of:					
i) Course provision	0	0	13	13	3
ii) Research	0	0	13	10	6

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q11 To what extent has this market research had an impact in determining the degree of change indicated in questions 1 through 5 ?	0	0	6	17	3

Q12 Does the university undertake any evaluation of the following areas? (please tick as many as appropriate)	
a) Student undergraduate profitability analysis	11
b) Student postgraduate profitability analysis	11
c) Course profitability analysis	16
d) Reseach profitability analysis	10
e) Costing of activities	21
f) Cost benefit approach to different forms of marketing	6

Concerning operating authority...

With the following questions in this section please indicate the degree of decentralisation to School / Faculty level at around the start of this decade andthe position now. Fully centralised indicates that decisions are taken at the top, i.e. Office of the Principle. In the sliding scale, number 1indicates that the University is fully centralised, whereas at the other end of the scale, number 5 indicates the academic department hasfull authority and responsibility.

	Early 1990's					Position now				
	1	2	3	4	5	1	2	3	4	5
Q13 i) Influence over the appointment of...										
a) Full time academic staff	2	7	10	5	7	3	0	12	6	10
b) Part time academic staff	1	1	7	7	15	2	1	4	6	18
ii) Influence over appointing administrative staff	3	6	7	4	8	3	3	6	4	12
iii) Influence over appointing support services (external to the university)	9	5	3	4	4	7	5	4	4	5
iv) Influence over the amount of remission on teaching to academic staff for research / administration	0	3	3	7	11	1	1	2	4	16
Q14 Approval to invest in information technology...	1	2	3	4	5	1	2	3	4	5
i) For academic activities	3	6	9	6	4	3	1	7	8	9
ii) For administration	4	6	12	3	2	3	4	6	7	7
Q15 Authority to develop and implement new courses...	1	2	3	4	5	1	2	3	4	5
i) undergraduate courses	7	7	6	7	4	6	4	5	13	3
ii) postgraduate courses	6	9	6	6	4	6	5	4	14	2
iii) other types, eg. Short courses, bespoke, professional	2	4	8	8	6	3	4	3	8	10
Q16 Approval to allow expenditure on the following type of cost:-	1	2	3	4	5	1	2	3	4	5
i) Travel - UK	3	1	3	8	15	3	1	1	1	24
ii) Travel - Overseas	3	2	4	6	15	3	1	2	1	23
iii) Staff overtime	3	4	7	2	10	2	1	3	8	13
iv) Items of capital nature, e.g. information technology	4	7	9	3	5	3	5	4	8	9
v) Conferences	2	1	4	5	18	1	1	1	1	26
vi) Appointment of a new member of staff	5	8	7	4	5	6	3	10	5	6

Q17 If research is becoming more important, has the degree of central support in terms of securing research grants been increased (e.g. setting up a central Research Office)

Yes	23
No	6

Q18 Is there any other way in which research activity has either been centralised or decentalised? Please specify...

Concerning revenue and expenditure...

Q19 To what extent is an academic head responsible for ensuring that the department meets financial targets set by the university for the year (in terms of a surplus / deficit / breakeven)?

1 indicates the Head has no responsibility whereas at the other end of the scale, 5 indicates the Head has full responsibility

	Early 1990's					Position now				
	1	2	3	4	5	1	2	3	4	5
	3	7	10	5	6	2	1	4	10	14

	Early 1990's		Position now	
	Yes	No	Yes	No
Q20 i) Are accounting records kept that identify **revenue** at the academic dept. level	12	17	24	7
ii) Are accounting records kept that identify **expenditure** at the academic dept. level	18	11	28	3
If yes...				
i) Are expenditure budgets (non pay costs) in existence at the academic dept. level	16	7	26	2
ii) Is the transfer of budget funds between budget heading permitted (i.e. Virement)	14	7	23	4
iii) Are staff budgets (pay costs) in existence at the academic dept. level	13	9	25	2
iv) Does the academic dept. have considerable influence in the budget setting process	9	14	17	10
Q21 Are the overheads of the University allocated to the academic dept. level	7	19	16	13
If yes...				
i. Has the allocation method of these overheads changed over the time period			13	6

Q22	i) Is the academic dept. more conscious of the **direct costs**[*1] it incurs now					24	2
	ii) Is the academic dept. more conscious of the **full costs**[*2] it incurs now					21	7
Q23	Is income from teaching related activities allocated to the academic dept.	8	13			24	5
	Is income from research grants allocated to the academic dept.	12	9			27	2
Q24	Does the centralised accounting function within the University provide financial information concerning:-						
	the **direct** costs[*3] of **teaching**	7	12			17	13
	the **direct** costs of **research**	8	11			16	14
	the **full** costs[*4] of **teaching**	3	15			9	19
	the **full** costs of **research**	0	16			6	22
	If yes to any parts of Q24...						
	Is this information available at the academic dept. level?	6	5			16	2

Concerning the next two questions, if the answer is yes, please also indicate the degree of change / additional resources by ticking the appropriate box in the range 1 - 5. 1 indicates no changes, whereas 5 indicates substantial change.

Q25 Has there been a change in the proportion of academic time taken up through financial management in the academic department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes	23	0	0	0	12	11
No	8					

Q26 Has the academic department had to allocate additional resources (administrative or academic) as a direct result of the requirement to be responsible for financial targets set by the university for the department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes	22	0	1	2	12	7
No	9					

Concerning the Accounting Information System

	Early 1990's		Position now	
	Yes	No	Yes	No
Q27 Is it possible to access accounting reports from the centralised accounting records at the academic department level…				
i) showing costs incurred on each course	0	25	1	28
ii) showing costs incurred on each research project	12	12	16	12
Q28 Is the central accounting function prepared to create accouting reports in a format the academic department requires (if different from standard)?	2	21	5	22

Please indicate briefly the type of bespoke report…

Q29 Is it possible to interrogate central accounting reports in order to produce reports other than standard?

3	18	7	18

Please indicate briefly the type of bespoke report…

	Early 1990's		Position now	
	Yes	No	Yes	No
Q30 Do academic departments keep records of revenues and costs of: -				
i) Undergraduate courses	1	23	7	22
ii) Postgraduate courses	1	22	8	20
iii) Research activity	6	18	16	12
iv) Other activities	5	19	11	15
If yes…				
a) is this different to that produced by the centre?	1	7	9	6
b) is this using: - (please tick as many as appropriate)				
i) Spreadsheets	4	2	12	2
ii) Other database, e.g. Access	2	2	2	3
iii) Specialised accounting software	2	1	3	3
iv) Paper records	3	2	6	3
Q31 a) Are the costs of financial incentives that are offered to students (Q4) clearly identified in the costing system at the…				
i. University level	3	10	4	9
ii. Academic department level	2	11	5	8
iii. Course level	1	12	3	10
b) Is the effectiveness of these financial incentives reviewed at least annually?	4	7	7	6

Q32 a) Within your University do you consider there are any bottlenecks that prevent growth?

If so are these…

i) Staff time	24
ii) Staff availability of adequate standard	19
iii) Room availability	14
iv) Timetabling	10
v) Insufficient demand from well qualified students	5
vi) Budgetary constraints	13

Other (please specify)

	Yes	No
b) Have any of these bottlenecks led to a proactive plan being developed in terms of the level of...		
i) Teaching	18	9
ii) Research	18	10

Concerning budgetary devolution

	Yes	No
Q33 a) Is there general acceptance that budgetary devolution has been successful	15	4
b) Has there been any subsequent move to recentralise this budgetary devolution	4	20
Q34 If budgetary devolution has taken place to the aademic department, have transfer pricing policies been developed (e.g. concerning payment for service teaching)	16	8
If yes...		
i) Has there been any problems with their introduction?	8	10
ii) Has this resulted in changes to the way courses are delivered?	7	11

If yes to either (i) or (ii) please specify

For the following questions please indicate the degree of change in your University from the early 1990's (more particularly the time immediately preceding the lifting of the binary divide between Universities and Polytechnics and the explosion in student numbers entering Higher Education) until the present day.

Concerning teaching...

		1 indicates no change at all 5 indicates dramatic change				
		1	2	3	4	5
Q1	The way in which the delivery of course content has changed on:-					
	i) undergraduate courses	0	2	8	8	3
	ii) postgraduate courses	0	2	5	7	5

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Q2	The amount of information technology that is used to deliver content to students on:-					
	i) undergraduate courses	0	0	1	10	10
	ii) postgraduate courses	0	0	1	13	5

If there has been change in the amount of IT used, has there been any financial analysis of the costs versus benefits of this?	*Yes*	5
	No	16

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Q3	The entry details of students in terms of					
	i) 'A' Level points for undergraduates	0	4	7	7	2
	ii) Age profile of:-					
	a) Undergraduates	0	4	9	6	0
	b) Postgraduates	0	1	14	4	0
	iii) Geographic catchment area of:-					
	a) Undergraduates	0	4	13	2	0
	b). Postgraduates	0	0	11	6	1
	iv) Application rate for places on:-					
	a) Undergraduate courses	1	6	4	8	1
	b) Postgraduate courses	1	2	10	4	3

Q4 The financial incentives offered to students to study on:-	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) undergraduate courses	2	3	10	4	0
ii) postgraduate courses	2	1	13	2	0

If there has been a change in the financial incentives given to students, what is the perceived (or actual) benefit of doing this? (please tick as many as appropriate)

i) Attract better students	5
ii) To recruit to certain types of courses	1
iii) Benefits greater than the costs	1
iv) Other (please specify)	

Q5 The range of:-	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) **undergraduate** courses on offer to students	0	2	2	11	6
ii) **postgraduate** courses on offer to students	1	2	3	9	5
iii) other types, eg. Short courses, bespoke, professional	0	0	4	8	7
iv) electives on **undergraduate** courses for students to select from	1	2	4	7	6
iv) electives on **postgraduate** courses for students to select from	0	0	5	11	2

Concerning research...

Q6 The degree to which research requirements have changed in terms of	significant decrease	moderate decrease	no change	moderate increase	significant increase
i) Proportion of staff actively undertaking externally funded research	0	1	3	13	3
ii) Proportion of staff actively undertaking research for RAE relevant output	0	1	2	10	7
iii) Students registering for research...					
a) Age profile	0	0	16	4	0
b) Number	0	2	4	14	1
c) Financial incentives being offered	1	0	11	8	0
iv) The demand for research active staff for academic positions within your organisation	0	0	3	9	8

Concerning market research...

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q7 The amount of formal developmental market research (as opposed to internal market research for evaluation purposes) undertaken as to:-					
i) Stakeholders requirements of undergraduate courses	0	0	6	12	2
ii) Stakeholders requirements of postgraduate courses	0	0	6	10	3
iii) Identify sources of research funding	0	0	6	7	7
iv) Identify sources of external funding (e.g. Sponsorship, Venture Capital)	0	0	9	5	6

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q8 The amount of internal market research undertaken as to:-					
i) Students views of undergraduate courses	0	0	3	10	7
ii) Students views of postgraduate courses	0	0	5	7	7
iii) Students requirements of the University	0	0	5	10	5

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q9 The investment in marketing activity					
i) Undertaken by the university	0	0	3	6	11
ii) by an external body on behalf of the university	0	1	9	6	1

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q10 The amount of formal evaluation of what other universities are doing in similar areas of:					
i) Course provision	0	0	7	9	4
ii) Research	0	1	6	9	4

	significant decrease	moderate decrease	no change	moderate increase	significant increase
Q11 To what extent has this market research had an impact in determining the degree of change indicated in questions 1 through 5 ?	0	0	6	8	3

Q12 Does the university undertake any evaluation of the following areas? (please tick as many as appropriate)

a) Student undergraduate profitability analysis	11
b) Student postgraduate profitability analysis	10
c) Course profitability analysis	10
d) Reseach profitability analysis	8
e) Costing of activities	16
f) Cost benefit approach to different forms of marketing	7

Concerning operating authority...

With the following questions in this section please indicate the degree of decentralisation to School / Faculty level at around the start of this decade andthe position now. Fully centralised indicates that decisions are taken at the top, i.e. Office of the Principle. In the sliding scale, number 1indicates that the University is fully centralised, whereas at the other end of the scale, number 5 indicates the academic department hasfull authority and responsibility.

	Early 1990's					Position now				
	1	2	3	4	5	1	2	3	4	5
Q13 i) Influence over the appointment of...										
a) Full time academic staff	3	5	5	3	2	2	3	0	6	7
b) Part time academic staff	0	2	2	4	10	1	1	1	4	11
ii) Influence over appointing administrative staff	1	6	7	3	1	3	1	4	5	5
iii) Influence over appointing support services (external to the university)	5	3	4	0	2	4	2	2	2	3
iv) Influence over the amount of remission on teaching to academic staff for research / administration	0	1	2	3	8	2	1	0	2	10
Q14 Approval to invest in information technology...	1	2	3	4	5	1	2	3	4	5
i) For academic activities	2	1	7	3	6	2	3	1	3	10
ii) For administration	6	1	7	3	2	6	1	2	4	6
Q15 Authority to develop and implement new courses...	1	2	3	4	5	1	2	3	4	5
i) undergraduate courses	1	3	8	2	5	2	6	3	3	5
ii) postgraduate courses	1	4	8	1	5	2	6	3	3	5
iii) other types, eg. Short courses, bespoke, professional	0	3	7	2	7	1	3	4	2	9
Q16 Approval to allow expenditure on the following type of cost:-	1	2	3	4	5	1	2	3	4	5
i) Travel - UK	1	1	4	2	11	0	1	1	2	15
ii) Travel - Overseas	1	1	5	2	10	2	2	2	1	10
iii) Staff overtime	1	4	5	0	8	2	2	2	1	10
iv) Items of capital nature, e.g. information technology	2	1	6	4	5	0	1	2	3	12
v) Conferences	1	1	3	2	11	0	1	0	3	14
vi) Appointment of a new member of staff	4	3	5	4	3	2	5	2	2	8

Q17 If research is becoming more important, has the degree of central support in terms of securing research grants been increased (e.g. setting up a central Research Office)

Yes	11
No	8

Q18 Is there any other way in which research activity has either been centralised or decentalised? Please specify...

Concerning revenue and expenditure...

Q19 To what extent is an academic head responsible for ensuring that the department meets financial targets set by the university for the year (in terms of a surplus / deficit / breakeven)?

1 indicates the Head has no responsibility whereas at the other end of the scale, 5 indicates the Head has full responsibility

Early 1990's					Position now				
1	2	3	4	5	1	2	3	4	5
2	4	3	3	6	2	2	2	3	10

	Early 1990's		Position now	
	Yes	No	Yes	No
Q20 i) Are accounting records kept that identify **revenue** at the academic dept. level	15	4	18	1
ii) Are accounting records kept that identify **expenditure** at the academic dept. level	17	1	19	0
If yes...				
i) Are expenditure budgets (non pay costs) in existence at the academic dept. level	16	3	17	2
ii) Is the transfer of budget funds between budget heading permitted (i.e. Virement)	13	6	16	3
iii) Are staff budgets (pay costs) in existence at the academic dept. level	8	11	14	5
iv) Does the academic dept. have considerable influence in the budget setting process	9	10	12	7

Q21	Are the overheads of the University allocated to the academic dept. level	6	10		12	5	
	If yes…						
	i. Has the allocation method of these overheads changed over the time period				12	2	
Q22	i) Is the academic dept. more conscious of the **direct costs**[*1] it incurs now				16	2	
	ii) Is the academic dept. more conscious of the **full costs**[*2] it incurs now				16	2	
Q23	Is income from teaching related activities allocated to the academic dept.	8	3		14	3	
	Is income from research grants allocated to the academic dept.	8	2		15	2	
Q24	Does the centralised accounting function within the University provide financial information concerning:-						
	the **direct** costs[*3] of **teaching**	5	7		13	3	
	the **direct** costs of **research**	5	8		15	2	
	the **full** costs[*4] of **teaching**				13	4	
	the **full** costs of **research**	5	8		13	4	
	If yes to any parts of Q24…						
	Is this information available at the academic dept. level?	4	4		14	2	

Concerning the next two questions, if the answer is yes, please also indicate the degree of change / additional resources by ticking the appropriate box in the range 1 - 5. 1 indicates no changes, whereas 5 indicates substantial change.

Q25 Has there been a change in the proportion of academic time taken up through financial management in the academic department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes	15	0	0	0	8	7
No	4					

Q26 Has the academic department had to allocate additional resources (administrative or academic) as a direct result of the requirement to be responsible for financial targets set by the university for the department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes	14	0	0	0	10	4
No	5					

Concerning the Accounting Information System

	Early 1990's		Position now	
	Yes	No	Yes	No
Q27 Is it possible to access accounting reports from the centralised accounting records at the academic department level...				
i) showing costs incurred on each course	4	15	6	13
ii) showing costs incurred on each research project	10	8	13	6
Q28 Is the central accounting function prepared to create accouting reports in a format the academic department requires (if different from standard)?	4	14	10	9

Please indicate briefly the type of bespoke report...

Q29 Is it possible to interrogate central accounting reports in order to produce reports other than standard?

3	13	7	10

Please indicate briefly the type of bespoke report...

	Early 1990's		Position now	
	Yes	No	Yes	No
Q30 Do academic departments keep records of revenues and costs of: -				
i) Undergraduate courses	5	14	8	11
ii) Postgraduate courses	7	11	9	9
iii) Research activity	13	6	15	4
iv) Other activities	13	5	14	4
If yes...				
a) is this different to that produced by the centre?	6	6	9	5
b) is this using: - (please tick as many as appropriate)				
i) Spreadsheets	5	3	10	1
ii) Other database, e.g. Access	2	2	4	1
iii) Specialised accounting software	1	3	2	4
iv) Paper records	6	2	7	2
Q31 a) Are the costs of financial incentives that are offered to students (Q4) clearly identified in the costing system at the...				
i. University level	2	5	5	3
ii. Academic department level	2	6	5	2
iii. Course level	2	6	5	3
b) Is the effectiveness of these financial incentives reviewed at least annually?	1	8	4	4

Q32 a) Within your University do you consider there are any bottlenecks that prevent growth?

If so are these...

i) Staff time	14
ii) Staff availability of adequate standard	5
iii) Room availability	7
iv) Timetabling	2
v) Insufficient demand from well qualified students	8
vi) Budgetary constraints	8

Other (please specify)

_____

_____

	Yes	No
b) Have any of these bottlenecks led to a proactive plan being developed in terms of the level of...		
i) Teaching	13	5
ii) Research	13	3

Concerning budgetary devolution

		Yes	No
Q33	a) Is there general acceptance that budgetary devolution has been successful	14	4
	b) Has there been any subsequent move to recentralise this budgetary devolution	3	15
Q34	If budgetary devolution has taken place to the aademic department, have transfer pricing policies been developed (e.g. concerning payment for service teaching)	10	6
	If yes...		
	i) Has there been any problems with their introduction?	6	7
	ii) Has this resulted in changes to the way courses are delivered?	4	7

If yes to either (i) or (ii) please specify

Given the changes in the Higher Education environment over the last decade which of the following strategies are being pursued by your organisation? (please tick as many as appropriate)

Changes to University Strategy in the last decade

a	New sources of income	30
b	Changes in ways courses are being delivered through...	
	i. Increased information technology	26
	ii. Reduction in student contact time	18
	iii. Consolidating disperate courses	16
	iv. Increasing student numbers per seminar / tutorial group	18
	v. Semesterisation	19
	vi. Modularisation	21
c	Changes to the balance of courses (income streams)	13
d	Changing the balance of activity between...	
	i. Academic departments (in terms of the scale of activity)	14
	ii. Courses (within the academic department and university)	13
	iii. Research versus Teaching	16
e	Increased profile of research	26
f	Major cost reduction initiatives	23
g	Devolving more responsibility for developing new strategies to the academic department level (within the financial targets set for thedepartment by the university)	25
h	Colaborative ventures with other universities	14
I	Franchising of courses	16
j	Improving the profile of the university within the local geographical area	23
k	Extending recruitment to new categories of students (overseas, mature, local etc)	26
l	Trying to achieve economies of scale by contracting out teaching by employing part time staff or consultants	6
m	Significant improvement in facilities for stakeholders	18

For the following questions please indicate the degree of change in your University from the early 1990's (more particularly the timeimmediatelypreceding the lifting of the binary divide between Universities and Polytechnics and the explosion in student numbersentering Higher Education) until the present day.

Concerning teaching...

Q2 The range of:-	1	2	3	4	5
i) **undergraduate** courses on offer to students	0	1	4	19	5
ii) **postgraduate** courses on offer to students	0	0	1	17	11
iii) other types, eg. Short courses, bespoke, professional	0	0	3	17	9
iv) electives on **undergraduate** courses for students to select from	0	0	6	16	5
iv) electives on **postgraduate** courses for students to select from	0	0	6	16	4

Concerning research...

Q3 The degree to which research requirements have changed in terms of	1	2	3	4	5
i) Proportion of staff actively undertaking externally funded research	0	1	7	12	10
ii) Proportion of staff actively undertaking research for RAE relevant output	0	2	5	12	11
iii) The demand for research active staff for academic positions within your organisation	0	0	7	13	10

Concerning market research...

		1	2	3	4	5
Q4	The amount of formal developmental market research (as opposed to internal market research for evaluation purposes) undertaken as to:-					
	i) Stakeholders requirements of undergraduate courses	0	0	11	12	3
	ii) Stakeholders requirements of postgraduate courses	0	0	11	13	2
	iii) Identify sources of research funding	0	0	8	18	2
	iv) Identify sources of external funding (e.g. Sponsorship, Venture Capital)	0	0	3	19	6
Q5	The amount of internal market research undertaken as to:-					
	i) Students views of undergraduate courses	0	0	2	13	12
	ii) Students views of postgraduate courses	0	0	2	17	8
	iii) Students requirements of the University	0	0	5	9	13
Q6	The investment in marketing activity					
	i) Undertaken by the university	0	0	3	18	7
	ii) by an external body on behalf of the university	0	1	20	6	1
Q7	The amount of formal evaluation of what other universities are doing in similar areas of:					
	i) Course provision	0	1	14	11	2
	ii) Research	0	1	16	10	1

Q8	Does the university undertake any evaluation of the following areas? (please tick as many as appropriate)	
	a) Student undergraduate profitability analysis	4
	b) Student postgraduate profitability analysis	4
	c) Course profitability analysis	13
	d) Reseach profitability analysis	19
	e) Costing of activities	20
	f) Cost benefit approach to different forms of marketing	1

Concerning operating authority...

With the following questions in this section please indicate the degree of decentralisation to School / Faculty level at around the start of thisdecade andthe position now. Fully centralised indicates that decisions are taken at the top, i.e. Office of the Principle. In the sliding scale,number 1indicates that the University is fully centralised, whereas at the other end of the scale, number 5 indicates the academic department has full authority and responsibility.

		Early 1990's					Position now				
		1	2	3	4	5	1	2	3	4	5
Q9	i) Influence over the appointment of...										
	a) Full time academic staff	10	5	7	3	3	5	6	6	9	4
	b) Part time academic staff	5	5	6	7	5	3	2	6	13	6
	ii) Influence over appointing administrative staff	6	4	11	3	4	3	2	9	9	7
	iii) Influence over appointing support services (external to the university)	8	8	4	5	3	7	4	7	7	5
	iv) Influence over the amount of remission on teaching to academic staff for research / administration	2	6	8	2	7	2	3	3	8	10
Q10	Approval to invest in information technology...										
	i) For teaching	6	6	5	7	5	2	2	13	8	5
	ii) For administration	8	7	5	6	3	5	3	13	6	3
Q11	Authority to develop and implement new courses...										
	i) undergraduate courses	10	6	7	4	2	8	5	5	10	2
	ii) postgraduate courses	10	4	8	5	2	7	4	6	11	2
	iii) other types, eg. Short courses, bespoke, professional	7	2	7	6	6	5	2	4	9	9
Q12	Approval to allow expenditure on the following type of cost:-										
	i) Travel - UK	1	3	4	9	12	1	1	3	5	20
	ii) Travel - Overseas	3	2	5	8	11	1	1	5	7	16
	iii) Staff overtime	1	4	6	10	7	1	1	3	12	12
	iv) Items of capital nature, e.g. information technology	3	9	4	7	6	3	3	9	7	8
	v) Conferences	1	4	4	9	11	1	2	2	8	17
	vi) Appointment of a new member of staff	11	8	7	0	3	8	5	6	8	3

Q13	If research is becoming more important, has the degree of central support in terms of securing research grants been increased (e.g. setting up a central Research Office)	Yes	20
		No	10

Q14 Is there any other way in which research activity has either been centralised or decentalised? Please specify...

Concerning revenue and expenditure...

Q15 To what extent is an academic head responsible for ensuring that the department meets financial targets set by the university for the year (in terms of a surplus / deficit / breakeven)?

1 indicates the Head has no responsibility whereas at the other end of the scale, 5 indicates the Head has full responsibility

	Early 1990's					Position now				
	1	2	3	4	5	1	2	3	4	5
	3	8	9	6	4	0	0	3	9	18

	Early 1990's		Position now	
	Yes	No	Yes	No
Q16 i) Are accounting records kept that identify **revenue** at the academic dept. level	16	14	26	4
ii) Are accounting records kept that identify **expenditure** at the academic dept. level	25	5	30	0
If yes...				
i) Are expenditure budgets (non pay costs) in existence at the academic dept. level	27	3	30	0
ii) Is the transfer of budget funds between budget heading permitted (i.e. Virement)	24	6	29	1
iii) Are staff budgets (pay costs) in existence at the academic dept. level	22	8	28	2
iv) Does the academic dept. have considerable influence in the budget setting process	10	20	19	11
Q17 Are the overheads of the University allocated to the academic dept. level	10	20	17	13
If yes...				
i. Has the allocation method of these overheads changed over the time period			10	7
Q18 i) Is the academic dept. more conscious of the direct costs[*1] it incurs now			25	2
ii) Is the academic dept. more conscious of the full costs[*2] it incurs now			14	13
Q19 Is income from teaching related activities allocated to the academic dept.	9	17	19	11
If yes, is this in accordance with the HEFCE funding model?			13	8
Is income from research grants allocated to the academic dept.	20	5	27	3
Q20 Does the centralised accounting function within the University provide financial information concerning:-				
the **direct** costs[*3] of **teaching**	20	7	24	5
the **direct** costs of **research**	21	6	25	4
the **full** costs[*4] of **teaching**	8	20	12	18
the **full** costs of **research**	8	20	13	17
If yes to any parts of Q20...				
Is this information available at the academic dept. level?	18	6	26	2

Concerning the next two questions, if the answer is yes, please also indicate the degree of change / additional resources by tickingthe appropriate box.

Q21 Has there been a change in the proportion of academic time taken up through financial management in the academic department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes	23	0	0	0	15	8
No	5					

Q22 Has the academic department had to allocate additional resources (administrative or academic) as a direct result of the requirement to be responsible for financial targets set by the university for the department?

		significant decrease	moderate decrease	no change	moderate increase	significant increase
Yes	21	0	0	0	17	3
No	8					

Concerning the Accounting Information System

	Early 1990's		Position now	
	Yes	No	Yes	No
Q23 Is it possible to access accounting reports from the centralised accounting records at the academic department level…				
i) showing costs incurred on each course	2	27	5	24
ii) showing costs incurred on each research project	19	10	27	2
Q24 Is the central accounting function prepared to create accouting reports in a format the academic department requires (if different from standard)?	12	17	22	7

Please indicate briefly the type of bespoke report…

Q25 Is it possible to interrogate central accounting reports in order to produce reports other than standard?

5	24	19	10

Please indicate briefly the type of bespoke report…

Q26 Do academic departments keep records of revenues and costs of: -

	Early 1990's		Position now	
	Yes	No	Yes	No
i) Undergraduate courses	6	20	8	19
ii) Postgraduate courses	7	19	9	18
iii) Research activity	20	6	25	2
iv) Other activities	19	7	24	3
If yes...				
a) is this different to that produced by the centre?	12	11	13	10
b) is this using: - (please tick as many as appropriate)				
i) Spreadsheets	10	2	14	16
ii) Other database, e.g. Access	6	2	6	1
iii) Specialised accounting software	7	2	7	3
iv) Paper records	10	1	11	0

Q27 Has the financial gearing of the university increased over the past decade

		1	2	3	4	5
Yes	19	0	0	0	11	8
No	9					

Q28 Does the central accounting function provide the only support in appraising projects that require resources?

	Early 1990's		Position now	
	Yes	No	Yes	No
i) Were these appraisals undertaken largely by analysing costs only?	15	11	12	13
ii) Or, did they include a detailed analysis of the incremental income streams?	10	16	7	19
	16	8	22	4

Q29 a) Within your University do you consider there are any bottlenecks that prevent growth?

If so are these…

i) Staff time	14
ii) Staff availability of adequate standard	12
iii) Room availability	7
iv) Timetabling	3
v) Insufficient demand from well qualified students	4
vi) Budgetary constraints	20

Other (please specify)

_____

_____

b) Have any of these bottlenecks led to a proactive plan being developed in terms of the level of…

	Yes	No
i) Teaching	16	12
ii) Research	15	13

Q30 In relation to concepts such as target pricing and target costing, has the University ever gone through a formal method of cost reduction to enable a specific opportunity (research or teaching) to generate a profit?

	Yes	No
	9	20

If 'yes', what method was employed to reduce these costs…

i) Fromal analysis of changing the profile of the activity	3	2
ii) Reducing costs of elements of the activity that were perceived to have little value added by the student/ consumer.	9	1

Other (please specify)

_____

_____

Concerning budgetary devolution

	Yes	No
Q31 a) Is there general acceptance that budgetary devolution has been successful	22	0
b) Has there been any subsequent move to recentralise this budgetary devolution	1	20
Q32 If budgetary devolution has taken place to the aademic department, have transfer pricing policies been developed (e.g. concerning payment for service teaching)	12	9
If yes…		
i) Has there been any problems with their introduction?	8	5
ii) Has this resulted in changes to the way courses are delivered?	6	5

If yes to either Q32 (i) or (ii) please specify

_____

Appendix 18: Question coding and full description of question wording

Question number/ description
Concerning teaching
Q1i Change of delivery of u/g course
Q1ii Change of delivery of p/g course
Q2i Use of IT to deliver u/g courses
Q2ii Use of IT to deliver p/g courses
Q3i Entry details in terms of 'A' Level points for u/g
Q3iib Age profile of u/g
Q3iib Age profile of p/g
Q3iiia Geographic catchment area of u/g
Q3iiib Geographic catchment area of p/g
Q3iva Application rate for places on u/g
Q3ivb Application rate for places on p/g
Q4i Financial incentives offered to students to study on u/g courses
Q4ii Financial incentives offered to students to study on p/g courses
Q5i Change of range of u/g courses
Q5ii Change of range of p/g courses
Q5iii Change of range of other courses
Q5iv Change of range of electives on u/g courses
Q5v Change of range of electives on p/g courses
Concerning research
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iiia Change of research requirements in terms of age profile of students registering for research
Q6iiib Change of research requirements in terms of number of students registering for research
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation
Concerning market research
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding
Q7ivThe amount of formal developmental market research undertaken as to identify sources of external funding
Q8i The amount of internal market research undertaken as to students views of u/g

courses
Q8ii The amount of internal market research undertaken as to students views of p/g courses
Q8iii The amount of internal market research undertaken as to students requirements of the university
Q9i Changes in the investment in marketing activity by the university
Q9ii Changes in the investment in marketing activity by an external body on behalf of the university
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research
Q11 Impact of market research in the degree of change as indicated in Q1 - Q5
Concerning operating authority
Q13ia.90, Q13ia.99 Influence over the appointment of full time academic staff early 1990s/ 1999
Q13ib.90, Q13ib.99 Influence over the appointment of part time academic staff early 1990s/ 1999
Q13ii.90, Q13ii.99 Influence over appointing administrative staff early 1990s/ 1999
Q13iii.90, Q13iii.99 Influence over appointing support services (external to the university) early 1990s/ 1999
Q13iv.90, Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration early 1990s/ 1999
Q14i.90, Q14i.99 Approval to invest in IT for academic activities early 1990s/ 1999
Q14ii.90, Q14ii.99 Approval to invest in IT for administration early 1990s/ 1999
Q15i.90, Q15i.99 Authority for u/g course development and implementation early 1990s/ 1999
Q15ii.90, Q15ii.99 Authority for p/g course development and implementation early 1990s/ 1999
Q15iii.90, Q15iii.99 Authority for other course development and implementation early 1990s/ 1999
Q16i.90, Q16i.99 Approval of travel expenditure (UK) early 1990s/ 1999
Q16ii.90, Q16ii.99 Approval of travel expenditure (o'seas) early 1990s/ 1999
Q16iii.90, Q16iii.99 Approval of overtime expenditure early 1990s/ 1999
Q16iv.90, Q16iv.99 Approval of capital expenditures early 1990s/ 1999
Q16v.90, Q16v.99 Approval of conferences early 1990s/ 1999
Q16vi.90 Q16vi.99 Approval of appointment of staff early 1990s / 1999
Q17 Increase of central support for increased research

The Accounting System

Concerning revenue and expenditure

Q19.90, Q19.99 Extent of HoD's responsibility for financial targets in early 1990s/ 1999

Q20ii.90, Q20ii.99 Accounting records to identify expenditure at the academic dept. level in early 1990s/ 1999

Q20bi.90, Q20bi.99 Non pay budgets existence in early 1990s/ 1999

Q20bii.90, Q20bii.99 Virement permitted in early 1990s/ 1999

Q20biii.90, Q20biii.99 Staff budgets existence in early 1990s/ 1999

Q20biv.90, Q20biv.99 Influence over time in budget setting process in early 1990s/ 1999

Q21a.90, Q21a.99 Overhead allocation to dept in early 1990s/ 1999

Q21i-c Allocation method changed over the time period

Q22i-c Academic dept more conscious of the direct costs it incurs now

Q22ii-c Academic dept more conscious of the full costs it incurs now

Q23i.90, Q23i.99 Income (teaching) allocation to dept in early 1990s/ 1999

Q23ii.90, Q23ii.99 Income (research) allocation to dept in early 1990s/ 1999

Q24i.90, Q24i.99 Financial info provide by centre (direct costs of teaching) in early 1990s/ 1999

Q24ii.90, Q24ii.99 Financial info provide by centre (direct costs of research) in early 1990s/ 1999

Q24iii.90, Q24iii.99 Financial info provide by centre (indirect costs of teaching) in early 1990s/ 1999

Q24iv.90, Q24iv.99 Financial info provide by centre (indirect costs of research) in early 1990s/ 1999

Q24v.90, Q24v.99 Info in Q24(i-iv) available at dept level in early 1990s/ 1999

Q25 Change in the proportion of academic time taken up through financial management of the academic dept

Q26 Academic dept allocated additional resources as a direct result of the requirement to be responsible for financial targets set by the university.

Concerning the Accounting Information System (AIS)

Q27i.90, Q27i.99 Access of acc reports for course costs in early 1990s/ 1999

Q27ii.90, Q27ii.99 Access of acc reports for research projects in early 1990s/ 1999

Q28.90. Q28.99 Ability of acc reports to be customised in early 1990s/ 1999

Q29.90, Q29.99 Ability to interrogate central acc reports to customise in early 1990s/ 1999

Q30ai.90, Q30ai.99 Records (rev & costs) kept at dept level of ug courses in early 1990s/ 1999

Q30aii.90, Q30aii.99 Records (rev & costs) kept at dept level of pg courses in early 1990s/ 1999

Q30aiii.90, Q30aiii.99 Records (rev & costs) kept at dept level of research activity in early 1990s/ 1999

Q30aiv.99, Q30aiv.99 Records (rev & costs) kept at dept level of other activity in early 1990s/ 1999

Q31ai.90, Q31ai.99 Identification of financial incentives (Q4) at Uni level in early 1990s/ 1999

Q31aii.90, Q31aii.99 Identification of financial incentives (Q4) at Dept level in early 1990s/ 1999
Q31aiii.90, Q31aiii.99 Identification of financial incentives (Q4) at course level in early 1990s/ 1999
Q31b.90, Q31b.99 Review of the effectiveness of these financial incentives on an annual basis in early 1990s/ 1999
Q32a Within the university are there any bottlenecks that prevent growth (sub analysed into 6 headings - see questionnaire)
Q32bi Bottlenecks led to a proactive plan being developed in terms of the level of teaching
Q32bii Bottlenecks led to a proactive plan being developed in terms of the level of research

Concerning budgetary devolution

Q33a General acceptance that budgetary devolution has been successful over the period
Q33b Subsequent move to recentralise budgetary devolution
Q34 Transfer pricing policies been developed as a result of budgetary devolution
Q34i Problems with the introduction of transfer pricing policies
Q34ii Changes to the way courses are delivered as a result of transfer pricing policies

The Accounting System Changes
Q20i-c AIS Change: Change in Accounting records to identify revenue at the academic dept. level over time
Q20ii-c AIS Change: Change in Accounting records to identify expenditure at the academic dept. level over time
Q20bi-c AIS Change: Expenditure budgets (non-pay) in existence at academic dept level
Q20bii-c AIS Change: Transfer of funds between budget heading permitted (virement)
Q20biii-c AIS Change: Staff budgets (pay) in existence at academic dept level
Q20biv-c AIS Change: Academic dept has considerable influence in the budget setting process
Q21-c AIS Change: Overheads allocated to the academic dept level
Q21i-c AIS Change: Allocation method changed over the time period
Q23i-c AIS Change: Change in income (teaching) allocation to dept over time
Q23ii-c AIS Change: Change in income (research) allocation to dept over time
Q24i-c AIS Change: Change in financial info provide by centre (direct costs of teaching)
Q24ii-c AIS Change: Change in financial info provide by centre (direct costs of research)
Q24iii-c AIS Change: Change in financial info provide by centre (indirect costs of teaching)
Q24iv-c AIS Change: Change in financial info provide by centre (indirect costs of research)
Q24v-c AIS Change: Change in info being available at dept level
Q27i-c:AIS Change: Access acc reports from centralised records to show costs incurred on each course
Q27ii-c:AIS Change: Access acc reports from centralised records to show costs incurred on research projects
Q28-c AIS Change: Change in ability of acc reports to be customised
Q29-c AIS Change: Change in ability to interrogate central acc reports to customise
Q30ai-c AIS Change: Academic dept keeping records of revenue and costs of ug courses
Q30aii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses
Q30aiii-c AIS Change: Academic dept keeping records of revenue and costs of research activity
Q30aiv-c AIS Change: Academic dept keeping records of revenue and costs of other activity
Q31ai-c: Change in identification of financial incentives (Q4) at Uni level
Q31aii-c AIS Change: Change in the identification of financial incentives offer to students (Q4) at acad dept level
Q31aiii-c AIS Change: Change in identification of financial incentives (Q4) at course level
Q31b-c AIS Change: Effectiveness of financial incentives offered (Q4) reviewed at least annually

Q33a AIS Change: General acceptance that budgetary devolution has been successful over the period
Q33b AIS Change: Subsequent move to recentralise budgetary devolution
Q34 AIS Change: Transfer pricing policies been developed as a result of budgetary devolution

Appendix 19: Statistically significant questions (Pearson Chi-Squared test) – 'new' and 'old' universities

New or Old University * Q4i: Financial incentives offered to students to study on u/g courses

Crosstab

Count

		Q4a.1: Financial incentives offered to students to study on u/g courses			
		significant decrease	no change	significant increase	Total
New or Old University	Old University	2	9	5	16
	New University	9	17	2	28
Total		11	26	7	44

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.325[a]	2	.070
Likelihood Ratio	5.334	2	.069
Linear-by-Linear Association	4.752	1	.029
N of Valid Cases	44		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 2.55.

New or Old University * Q4ii: Financial incentives offered to students to study on p/g courses

Crosstab

Count

		Q4a.2: Financial incentives offered to students to study on p/g courses			
		significant decrease	no change	significant increase	Total
New or Old University	Old University	1	10	6	17
	New University	6	18	2	26
Total		7	28	8	43

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.247[a]	2	.044
Likelihood Ratio	6.476	2	.039
Linear-by-Linear Association	5.785	1	.016
N of Valid Cases	43		

a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 2.77.

New or Old University * Q5i: Change of range of u/g courses

Crosstab

Count

		Q5.1: Change of range of u/g courses			
		significant decrease	no change	significant increase	Total
New or Old University	Old University	2	7	25	34
	New University	3	2	38	43
Total		5	9	63	77

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.672[a]	2	.097
Likelihood Ratio	4.791	2	.091
Linear-by-Linear Association	1.122	1	.290
N of Valid Cases	77		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 2.21.

New or Old University * Q6ii: Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output

Crosstab

Count

		Q6.2: Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output			
		significant decrease	no change	significant increase	Total
New or Old University	Old University	2	10	23	35
	New University	2	3	37	42
Total		4	13	60	77

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.453[a]	2	.040
Likelihood Ratio	6.636	2	.036
Linear-by-Linear Association	3.394	1	.065
N of Valid Cases	77		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.82.

New or Old University * Q10ii: Change in the amount of formal evaluation of what other universities are doing in similar areas of research

Crosstab

Count

		Q10.2: Change in the amount of formal evaluation of what other universities are doing in similar areas of research			
		significant decrease	no change	significant increase	Total
New or Old University	Old University		19	13	32
	New University	2	15	24	41
Total		2	34	37	73

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.703[a]	2	.095
Likelihood Ratio	5.452	2	.065
Linear-by-Linear Association	.989	1	.320
N of Valid Cases	73		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .88.

New or Old University * Q13ia.99: Influence over the appointment of full time academic staff now

Crosstab

Count

		Q13.1a: Influence over the appoinment of full time academic staff now			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	13	9	12	34
	New University	6	8	27	41
Total		19	17	39	75

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.822[a]	2	.020
Likelihood Ratio	7.966	2	.019
Linear-by-Linear Association	7.661	1	.006
N of Valid Cases	75		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.71.

New or Old University * Q13ii.99: Influence over appointing administrative staff now

Crosstab

Count

		Q13.2: Influence over appointing administrative staff now			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	10	9	12	31
	New University	5	8	28	41
Total		15	17	40	72

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.869[a]	2	.032
Likelihood Ratio	6.947	2	.031
Linear-by-Linear Association	6.669	1	.010
N of Valid Cases	72		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.46.

New or Old University * Q16vi.99 Approval of appointment of staff now

Crosstab

Count

		Q16.6 Approval of appointment of staff now			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	17	9	7	33
	New University	11	9	22	42
Total		28	18	29	75

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.081[a]	2	.018
Likelihood Ratio	8.361	2	.015
Linear-by-Linear Association	7.659	1	.006
N of Valid Cases	75		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.92.

New or Old University * Q15i.99: Authority for u/g course development and implementation now

Crosstab

Count

		Q15.1: Authority for u/g course development and implementation now			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	21	4	9	34
	New University	9	9	24	42
Total		30	13	33	76

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.841[a]	2	.002
Likelihood Ratio	13.142	2	.001
Linear-by-Linear Association	11.300	1	.001
N of Valid Cases	76		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.82.

New or Old University * Q15ii.99: Authority for p/g course development and implementation now

Crosstab

Count

		Q15.2: Authority for p/g course development and implementation now			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	20	5	9	34
	New University	9	8	25	42
Total		29	13	34	76

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.681[a]	2	.003
Likelihood Ratio	11.969	2	.003
Linear-by-Linear Association	11.160	1	.001
N of Valid Cases	76		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.82.

New or Old University * Q15iii.90: Authority for other course development and implementation early 1990's

Crosstab

Count

		Q15.3: Authority for other course development and implementation early 1990's			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	11	7	14	32
	New University	5	15	19	39
Total		16	22	33	71

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.278[a]	2	.071
Likelihood Ratio	5.352	2	.069
Linear-by-Linear Association	1.926	1	.165
N of Valid Cases	71		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.21.

New or Old University * Q15iii.99: Authority for other course development and implementation now

Crosstab

Count

		Q15.3: Authority for other course development and implementation now			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	13	6	13	32
	New University	4	5	31	40
Total		17	11	44	72

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.472[a]	2	.003
Likelihood Ratio	11.801	2	.003
Linear-by-Linear Association	11.304	1	.001
N of Valid Cases	72		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.89.

New or Old University * Q14i.90: Approval to invest in IT for academic activities early 1990's

Crosstab

Count

		Q14.1: Approval to invest in IT for academic activities early 1990's			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	6	9	16	31
	New University	18	8	15	41
Total		24	17	31	72

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.795[a]	2	.091
Likelihood Ratio	4.977	2	.083
Linear-by-Linear Association	3.614	1	.057
N of Valid Cases	72		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.32.

New or Old University * Q16ii.90: Approval of travel expenditure (o'seas) early 1990's

Crosstab

Count

		Q16.2: Approval of travel expenditure (o'seas) early 1990's			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	1	5	28	34
	New University	11	9	20	40
Total		12	14	48	74

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.391[a]	2	.006
Likelihood Ratio	11.763	2	.003
Linear-by-Linear Association	10.228	1	.001
N of Valid Cases	74		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.51.

New or Old University * Q16iv.90: Approval of capital expenditures early 1990's

Crosstab

Count

		Q16.4: Approval of capital expenditures early 1990's			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
New or Old University	Old University	6	9	17	32
	New University	19	8	12	39
Total		25	17	29	71

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.059[a]	2	.029
Likelihood Ratio	7.337	2	.026
Linear-by-Linear Association	6.264	1	.012
N of Valid Cases	71		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.66.

New or Old University * Q21i: If o'heads are allocated to academic dept level, has the allocation method changed?

Crosstab

Count

		Q21b: If o'heads are allocated to academic dept level, has the allocation method changed?		
		yes	no	Total
New or Old University	Old University	15	10	25
	New University	19	4	23
Total		34	14	48

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.964[b]	1	.085		
Continuity Correction[a]	1.971	1	.160		
Likelihood Ratio	3.045	1	.081		
Fisher's Exact Test				.117	.079
Linear-by-Linear Association	2.902	1	.088		
N of Valid Cases	48				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.71.

New or Old University * Q30iii.90: Records of revenues and costs of research activity in early 1990s

Crosstab

Count

		Q30A.3: Records of revenues and costs of research activity in early 1990s		
		yes	no	Total
New or Old University	Old University	19	9	28
	New University	17	21	38
Total		36	30	66

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.476[b]	1	.062		
Continuity Correction[a]	2.606	1	.106		
Likelihood Ratio	3.527	1	.060		
Fisher's Exact Test				.082	.053
Linear-by-Linear Association	3.423	1	.064		
N of Valid Cases	66				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.73.

New or Old University * Q30iv.90: Records of revenues and costs of other activities in early 1990s

Crosstab

Count

		Q30A.4: Records of revenues and costs of other activities in early 1990s		
		yes	no	Total
New or Old University	Old University	19	8	27
	New University	15	23	38
Total		34	31	65

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.040[b]	1	.014		
Continuity Correction[a]	4.865	1	.027		
Likelihood Ratio	6.173	1	.013		
Fisher's Exact Test				.023	.013
Linear-by-Linear Association	5.947	1	.015		
N of Valid Cases	65				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.88.

New or Old University * Q30a.90: Records of academic dept are different to ones produced by the centre in early 1990s

Crosstab

Count

		Q30B.a: Records of academic dept are different to ones produced by the centre in early 1990s		
		yes	no	Total
New or Old University	Old University	11	8	19
	New University	7	15	22
Total		18	23	41

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.815[b]	1	.093		
Continuity Correction[a]	1.856	1	.173		
Likelihood Ratio	2.841	1	.092		
Fisher's Exact Test				.122	.086
Linear-by-Linear Association	2.746	1	.097		
N of Valid Cases	41				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.34.

New or Old University * Q27ii.99: Access of centralised accounts records showing costs incurred on each research project now

Crosstab

Count

		Q27.2: Access of centralised accounts records showing costs incurred on each research project now		
		yes	no	Total
New or Old University	Old University	26	5	31
	New University	27	14	41
Total		53	19	72

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.950[b]	1	.086		
Continuity Correction[a]	2.095	1	.148		
Likelihood Ratio	3.064	1	.080		
Fisher's Exact Test				.109	.072
Linear-by-Linear Association	2.909	1	.088		
N of Valid Cases	72				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.18.

New or Old University * Q30i.99: Records of revenues and costs of u/g courses now

Crosstab

Count

		Q30A.1: Records of revenues and costs of u/g courses now		
		yes	no	Total
New or Old University	Old University	4	26	30
	New University	16	25	41
Total		20	51	71

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.651[b]	1	.017		
Continuity Correction[a]	4.453	1	.035		
Likelihood Ratio	6.018	1	.014		
Fisher's Exact Test				.031	.016
Linear-by-Linear Association	5.571	1	.018		
N of Valid Cases	71				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.45.

Appendix 20: Statistically significant questions (Pearson Chi-Squared test) – business and non-business departments (Category)

Category * Q1ii Change of delivery of p/g course

Crosstab

Count

		Q1.2 Change of delivery of p/g course			
		no change at all	moderate changes	dramatic changes	Total
Category	Business related schools	10	12	8	30
	Non-Business school	2	5	12	19
Total		12	17	20	49

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.894[a]	2	.032
Likelihood Ratio	7.107	2	.029
Linear-by-Linear Association	6.397	1	.011
N of Valid Cases	49		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.65.

Category * Q2ii: Use of IT to deliver p/g courses

Crosstab

Count

		Q2a.2: Use of IT to deliver p/g courses		
		no change	significant increase	Total
Category	Business related schools	9	20	29
	Non-Business school	1	18	19
Total		10	38	48

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.623[b]	1	.032		
Continuity Correction[a]	3.192	1	.074		
Likelihood Ratio	5.368	1	.021		
Fisher's Exact Test				.065	.032
Linear-by-Linear Association	4.526	1	.033		
N of Valid Cases	48				

a. Computed only for a 2x2 table

b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.96.

Category * Q3ivb: Application rate for places on p/g

Crosstab

Count

		Q3.4b: Application rate for places on p/g			
		significant decrease	no change	significant increase	Total
Category	Business related schools	3	7	20	30
	Non-Business school	3	10	7	20
Total		6	17	27	50

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.988[a]	2	.083
Likelihood Ratio	5.045	2	.080
Linear-by-Linear Association	3.269	1	.071
N of Valid Cases	50		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.40.

Category * Q9i: Changes in the investment in marketing activity undertaken by the university

Crosstab

Count

		Q9.1: Changes in the investment in marketing activity undertaken by the university		
		no change	significant increase	Total
Category	Business related schools		28	28
	Non-Business school	3	17	20
Total		3	45	48

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.480[b]	1	.034		
Continuity Correction[a]	2.286	1	.131		
Likelihood Ratio	5.536	1	.019		
Fisher's Exact Test				.066	.066
Linear-by-Linear Association	4.387	1	.036		
N of Valid Cases	48				

a. Computed only for a 2x2 table

b. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.25.

Category * Q13ia.99: Influence over the appointment of full time academic staff now

Crosstab

Count

		Q13.1a: Influence over the appoinment of full time academic staff now			
		Fully centralised	Shared responsibility	Full authority with academic dept.	Total
Category	Business related schools	3	12	16	31
	Non-Business school	5		13	18
Total		8	12	29	49

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.070[a]	2	.007
Likelihood Ratio	13.961	2	.001
Linear-by-Linear Association	.012	1	.912
N of Valid Cases	49		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.94.

Category * Q20i.90: Accounting records to identify revenue at the academic dept. level in early 1990s

Crosstab

Count

		Q20a.1: Accounting records to identify revenue at the academic dept. level in early 1990s		
		yes	no	Total
Category	Business related schools	12	17	29
	Non-Business school	15	4	19
Total		27	21	48

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.583[b]	1	.010		
Continuity Correction[a]	5.145	1	.023		
Likelihood Ratio	6.897	1	.009		
Fisher's Exact Test				.017	.011
Linear-by-Linear Association	6.446	1	.011		
N of Valid Cases	48				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.31.

Category * Q23i.90: Income from teaching activities allocated to the academic dept. in early 1990's

Crosstab

Count

		Q23.1: Income from teaching activities allocated to the academic dept. in early 1990's		
		yes	no	Total
Category	Business related schools	8	13	21
	Non-Business school	8	3	11
Total		16	16	32

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.463[b]	1	.063		
Continuity Correction[a]	2.216	1	.137		
Likelihood Ratio	3.560	1	.059		
Fisher's Exact Test				.135	.068
Linear-by-Linear Association	3.355	1	.067		
N of Valid Cases	32				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.50.

Category * Q24i.99: Financial info concerning direct costs of teaching now

Crosstab

Count

		Q24.1: Financial info concerning direct costs of teaching now		
		yes	no	Total
Category	Business related schools	17	13	30
	Non-Business school	13	3	16
Total		30	16	46

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.780[b]	1	.095		
Continuity Correction[a]	1.802	1	.179		
Likelihood Ratio	2.944	1	.086		
Fisher's Exact Test				.117	.088
Linear-by-Linear Association	2.720	1	.099		
N of Valid Cases	46				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.57.

Category * Q24ii.99: Financial info concerning direct costs of research now

Crosstab

Count

		Q24.1: Financial info concerning direct costs of research now		
		yes	no	Total
Category	Business related schools	16	14	30
	Non-Business school	15	2	17
Total		31	16	47

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.887[b]	1	.015		
Continuity Correction[a]	4.435	1	.035		
Likelihood Ratio	6.513	1	.011		
Fisher's Exact Test				.024	.015
Linear-by-Linear Association	5.762	1	.016		
N of Valid Cases	47				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.79.

Category * Q24iii.99: Financial info concerning full costs of teaching now

Crosstab

Count

		Q24.3: Financial info concerning full costs of teaching now		
		yes	no	Total
Category	Business related schools	9	19	28
	Non-Business school	13	4	17
Total		22	23	45

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.318[b]	1	.004		
Continuity Correction[a]	6.639	1	.010		
Likelihood Ratio	8.646	1	.003		
Fisher's Exact Test				.006	.005
Linear-by-Linear Association	8.133	1	.004		
N of Valid Cases	45				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.31.

Category * Q24iv.99: Financial info concerning full costs of research now

Crosstab

Count

		Q24.4: Financial info concerning full costs of research now		
		yes	no	Total
Category	Business related schools	6	22	28
	Non-Business school	13	4	17
Total		19	26	45

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.137[b]	1	.000		
Continuity Correction[a]	10.977	1	.001		
Likelihood Ratio	13.643	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	12.845	1	.000		
N of Valid Cases	45				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.18.

Category * Q28.99: Accounting function is prepared to create accounting reports in different formats now

Crosstab

Count

		Q28: Accounting function is prepared to create accounting reports in different formats now		
		yes	no	Total
Category	Business related schools	5	22	27
	Non-Business school	10	9	19
Total		15	31	46

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.906[b]	1	.015		
Continuity Correction[a]	4.455	1	.035		
Likelihood Ratio	5.924	1	.015		
Fisher's Exact Test				.025	.017
Linear-by-Linear Association	5.777	1	.016		
N of Valid Cases	46				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.20.

Category * Q30iii.90: Records of revenues and costs of research activity in early 1990s

Crosstab

Count

		Q30A.3: Records of revenues and costs of research activity in early 1990s		
		yes	no	Total
Category	Business related schools	6	18	24
	Non-Business school	13	6	19
Total		19	24	43

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.107[b]	1	.004		
Continuity Correction[a]	6.442	1	.011		
Likelihood Ratio	8.337	1	.004		
Fisher's Exact Test				.006	.005
Linear-by-Linear Association	7.919	1	.005		
N of Valid Cases	43				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.40.

Category * Q30iv.90: Records of revenues and costs of other activities in early 1990s

Crosstab

Count

		Q30A.4: Records of revenues and costs of other activities in early 1990s		
		yes	no	Total
Category	Business related schools	5	19	24
	Non-Business school	13	5	18
Total		18	24	42

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.091[b]	1	.001		
Continuity Correction[a]	9.092	1	.003		
Likelihood Ratio	11.530	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	10.827	1	.001		
N of Valid Cases	42				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.71.

Category * Q30iv.99: Records of revenues and costs of other activities now

Crosstab

Count

		Q30A.4: Records of revenues and costs of other activities now		
		yes	no	Total
Category	Business related schools	11	15	26
	Non-Business school	14	4	18
Total		25	19	44

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.454[b]	1	.020		
Continuity Correction[a]	4.104	1	.043		
Likelihood Ratio	5.681	1	.017		
Fisher's Exact Test				.030	.020
Linear-by-Linear Association	5.330	1	.021		
N of Valid Cases	44				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.77.

Appendix 21: Factor Analysis of the External Environment ('new' universities)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.4197	22.5823	22.5823	3.6111	15.0461	15.0461
2	3.4810	14.5043	37.0866	2.4660	10.2751	25.3212
3	2.5877	10.7822	47.8687	2.3356	9.7317	35.0529
4	2.0296	8.4567	56.3254	2.1253	8.8554	43.9083
5	1.6707	6.9611	63.2866	2.0846	8.6859	52.5942
6	1.4997	6.2488	69.5353	1.8989	7.9122	60.5064
7	1.1866	4.9441	74.4794	1.7646	7.3527	67.8590
8	1.0830	4.5124	78.9919	1.6410	6.8374	74.6965
9	0.9737	4.0569	83.0488	1.4591	6.0797	80.7761
10	0.8054	3.3560	86.4048	1.3509	5.6286	86.4048
11	0.6817	2.8403	89.2451			
12	0.6362	2.6508	91.8959			
13	0.4152	1.7300	93.6259			
14	0.3939	1.6413	95.2671			
15	0.3273	1.3638	96.6310			
16	0.2437	1.0153	97.6463			
17	0.2250	0.9376	98.5839			
18	0.1206	0.5024	99.0863			
19	0.1005	0.4187	99.5050			
20	0.0518	0.2160	99.7209			
21	0.0365	0.1520	99.8730			
22	0.0217	0.0902	99.9632			
23	0.0057	0.0237	99.9869			
24	0.0031	0.0131	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

	Component									
	1	2	3	4	5	6	7	8	9	10
Q1i Change of delivery of u/g course	-0.160037	0.116517	0.014089	0.074884	-0.158986	-0.176578	-0.869124	0.121561	0.035102	-0.003938
Q1ii Change of delivery of p/g course	0.056303	0.001236	0.065472	0.006008	-0.076097	0.030549	-0.10064	0.949403	-0.107339	-0.068446
Q2i Use of IT to deliver u/g courses	-0.07411	0.920608	-0.02001	-0.017633	0.087273	0.079035	-0.219881	0.080668	-0.024998	0.016593
Q2ii Use of IT to deliver p/g courses	-0.272041	0.584266	0.237439	-0.163891	-0.18155	-0.052018	0.311085	0.41509	-0.277228	-0.186295
Q3i Entry details in terms of 'A' Level points for u/g	-0.210039	0.241134	0.071979	0.011822	0.827824	0.071103	-0.026222	-0.150564	0.014998	-0.06244
Q3iib Age profile of u/g	0.07277	0.048064	0.121576	-0.037333	0.000997	-0.01913	-0.039022	-0.099582	0.928181	-0.173631
Q3iib Age profile of p/g	0.177445	0.257236	0.622824	0.116433	-0.074362	0.174557	0.269893	0.008055	0.239903	-0.131652
Q3iiia Geographic catchment area of u/g	0.14595	-0.128704	0.006622	0.852791	0.13679	0.199836	0.043306	-0.039406	-0.211647	-0.093185
Q3iiib Geographic catchment area of p/g	0.035075	0.207107	0.074113	0.284791	-0.041422	0.801731	0.085286	-0.194865	-0.143735	-0.146259
Q3iva Application rate for places on u/g	-0.218222	0.176052	-0.217113	0.773812	0.031733	0.110582	-0.201352	0.016634	0.238761	0.12034
Q3ivb Application rate for places on p/g	-0.556815	0.155613	0.118161	0.467567	0.190135	0.408535	0.364863	0.097594	0.100447	0.032541
Q4i Financial incentives offered to students to study on u/g courses	0.693228	-0.110143	0.299582	-0.016377	-0.135844	0.154918	0.429375	0.186955	0.009851	0.126357
Q4ii Financial incentives offered to students to study on p/g courses	0.883541	-0.07791	-0.016544	-0.05555	-0.120517	0.165489	-0.151071	-0.153517	-0.008959	0.087178
Q5i Change of range of u/g courses	0.083895	-0.055111	0.052217	0.003219	-0.085129	0.008027	0.012478	-0.08427	-0.178297	0.93012
Q5ii Change of range of p/g courses	0.19995	-0.126356	-0.035129	0.027984	0.331644	0.679433	0.143174	0.282641	0.16603	0.24209
Q5iii Change of range of other courses	-0.101678	-0.078234	0.836597	-0.038055	0.035404	-0.196253	0.11191	0.167064	-0.011176	0.224027
Q5iv Change of range of electives on u/g courses	0.55427	-0.445076	-0.130634	0.282069	0.102787	0.163661	0.183892	0.153655	0.161709	0.285246
Q5v Change of range of electives on p/g courses	0.27068	-0.250571	-0.284937	0.405822	0.109202	0.548691	0.143784	0.390658	0.017934	0.035051
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.316439	-0.108737	-0.285823	0.261338	0.762163	0.152989	0.243332	0.043571	0.032592	-0.014691
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	0.374533	-0.161439	-0.555528	0.22613	0.522986	0.050789	0.139948	0.01387	-0.011615	-0.247682
Q6iiia Change of research requirements in terms of age profile of students registering for research	0.152704	-0.728184	-0.071145	-0.149102	-0.130202	0.026213	-0.112683	0.263683	-0.426403	0.037142
Q6iiib Change of research requirements in terms of number of students registering for research	0.600548	-0.386515	-0.076032	-0.069327	0.4179	-0.182195	0.224501	0.130423	-0.183742	0.138199
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research	0.843444	-0.010224	-0.029662	0.043855	0.181414	0.048995	0.151262	0.0973	0.107338	-0.107163
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	-0.082868	-0.020639	-0.711108	0.231025	0.108162	-0.135701	0.369483	0.127743	-0.051112	0.201462

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a

Rotation converged in 17 iterations.

Appendix 22: Factor Analysis of the External Environment ('old' universities)

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.9346	20.5609	20.5609	2.8299	11.7911	11.7911
2	3.0994	12.9142	33.4751	2.7820	11.5917	23.3829
3	2.9201	12.1673	45.6424	2.4465	10.1939	33.5768
4	2.4713	10.2973	55.9396	2.3948	9.9784	43.5551
5	1.9737	8.2237	64.1634	2.3518	9.7992	53.3544
6	1.9101	7.9588	72.1222	2.2988	9.5785	62.9328
7	1.3437	5.5987	77.7208	2.0884	8.7018	71.6347
8	1.2292	5.1216	82.8424	2.0096	8.3733	80.0079
9	0.9931	4.1380	86.9805	1.6734	6.9725	86.9805
10	0.7366	3.0691	90.0495			
11	0.5873	2.4471	92.4966			
12	0.5362	2.2341	94.7307			
13	0.4674	1.9473	96.6780			
14	0.3526	1.4692	98.1472			
15	0.2407	1.0029	99.1502			
16	0.0996	0.4150	99.5651			
17	0.0777	0.3236	99.8887			
18	0.0267	0.1113	100.0000			
19	0.0000	0.0000	100.0000			
20	0.0000	0.0000	100.0000			
21	0.0000	0.0000	100.0000			
22	0.0000	0.0000	100.0000			
23	0.0000	0.0000	100.0000			
24	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

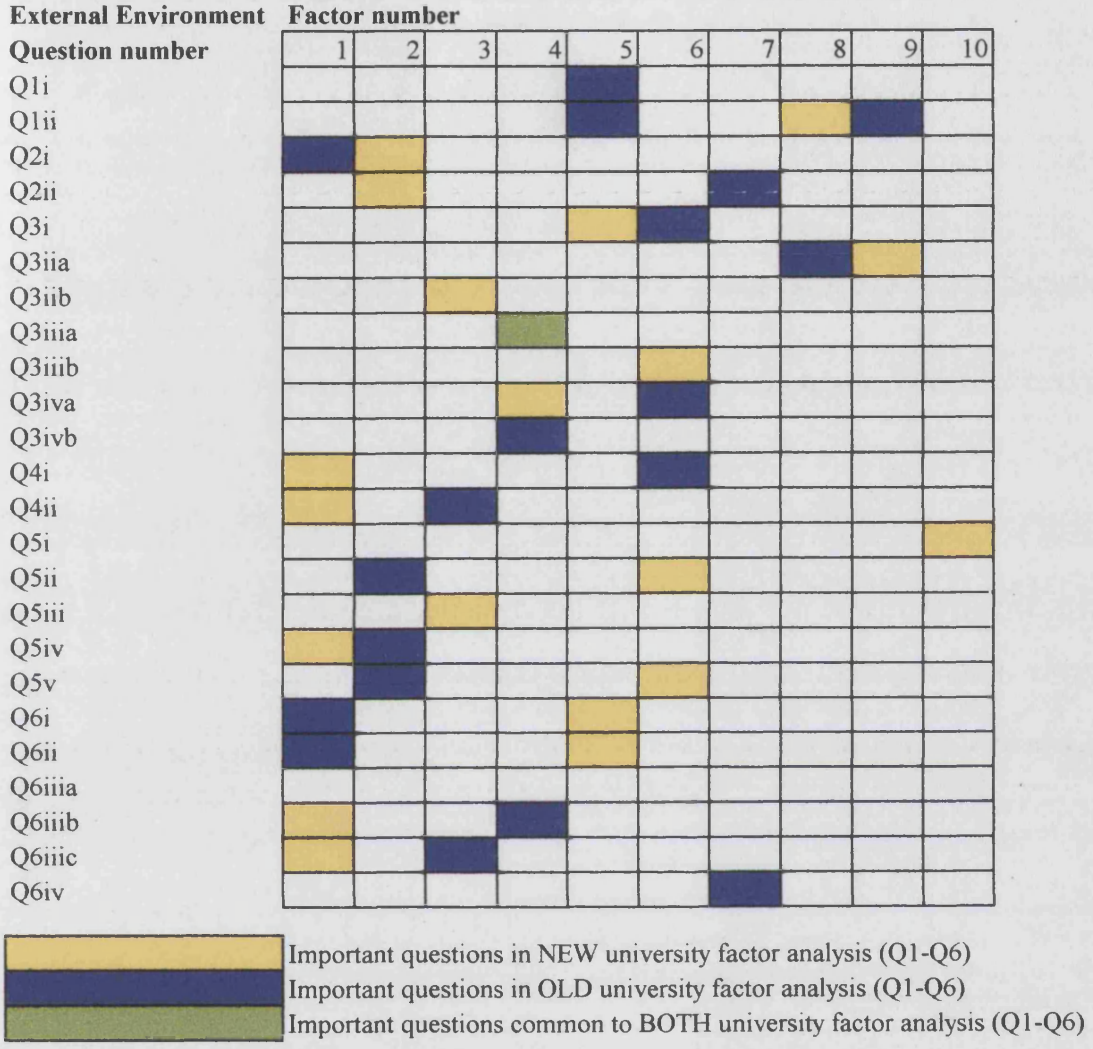
	Component								
	1	2	3	4	5	6	7	8	9
Q1i Change of delivery of u/g course	0.086248	0.149651	-0.063114	-0.147177	0.887567	0.010014	-0.04034	0.180163	0.113381
Q1ii Change of delivery of p/g course	0.00816	0.065533	0.132927	-0.132598	0.668076	0.117461	0.086612	-0.156254	0.560017
Q2i Use of IT to deliver u/g courses	0.87174	0.048114	-0.149915	-0.00727	0.184873	-0.159941	0.055177	-0.153778	0.110435
Q2ii Use of IT to deliver p/g courses	-0.108823	0.136905	0.141901	-0.282883	0.019324	-0.066565	0.810893	-0.240019	0.198727
Q3i Entry details in terms of 'A' Level points for u/g	-0.065819	-0.081662	0.090259	0.040705	0.012672	0.860509	0.184481	-0.135856	0.270945
Q3iib Age profile of u/g	-0.055492	-0.02722	-0.063619	-0.143399	-0.108329	0.118699	-0.060974	0.929041	0.094764
Q3iib Age profile of p/g	0.044936	0.061379	0.08088	-0.061016	-0.840175	-0.034051	-0.076859	0.271525	0.144268
Q3iiia Geographic catchment area of u/g	-0.229391	-0.089719	-0.047368	0.799472	-0.044923	0.154223	-0.357591	-0.001397	-0.049695
Q3iiib Geographic catchment area of p/g	-0.074862	0.01638	-0.232848	0.219138	-0.436113	-0.392888	-0.624236	0.296953	0.152147
Q3iva Application rate for places on u/g	-0.159832	0.381227	-0.249899	-0.441035	-0.131821	0.601795	0.172007	0.228092	0.203903
Q3ivb Application rate for places on p/g	-0.194074	0.474303	0.33946	0.538291	-0.072465	-0.299564	0.274148	0.114072	0.180781
Q4i Financial incentives offered to students to study on u/g courses	0.213287	0.094262	0.258235	-0.072706	0.234364	0.743782	-0.11048	0.375862	-0.131841
Q4ii Financial incentives offered to students to study on p/g courses	0.150645	0.176696	0.752394	0.153978	-0.007178	0.326223	0.010691	0.430933	-0.073029
Q5i Change of range of u/g courses	0.334326	0.319771	-0.696074	0.164159	-0.128593	0.06643	0.115716	0.005443	0.06835
Q5ii Change of range of p/g courses	-0.005156	0.878459	0.060801	0.183396	0.08792	-0.035595	0.16568	0.119203	0.155274
Q5iii Change of range of other courses	0.179048	-0.048372	-0.33176	-0.364522	0.136344	0.25762	-0.003468	-0.532846	0.311333
Q5iv Change of range of electives on u/g courses	0.218602	0.765811	-0.372075	-0.138533	-0.039279	0.088944	0.107418	-0.093402	-0.246532
Q5v Change of range of electives on p/g courses	0.195166	0.868644	-0.036529	-0.104223	0.086542	0.05532	-0.141766	-0.061336	0.153813
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.847057	0.21378	0.008463	-0.197235	-0.039048	0.204362	0.036671	0.141849	-0.004019
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	0.881627	0.050218	0.008529	-0.34489	-0.076924	0.004213	0.011753	-0.072814	0.037216
Q6iiia Change of research requirements in terms of age profile of students registering for research	-0.137336	-0.17546	-0.090011	0.011554	-0.019776	-0.156017	-0.277057	-0.080297	-0.868197
Q6iiib Change of research requirements in terms of number of students registering for research	-0.249257	0.047811	0.026754	0.811992	-0.122073	-0.141258	-0.108412	-0.086734	-0.023179
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research	-0.00337	-0.075267	0.836758	0.073971	-0.143188	0.087716	0.10549	-0.16348	0.215948
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	0.214561	0.010562	-0.222336	-0.052932	-0.020724	0.180928	0.752888	0.243283	0.238675

Extraction Method: Principal Component Analysis. □ Rotation Method: Varimax with Kaiser Normalization.

a

Rotation converged in 16 iterations.

Appendix 23: Graphical summary of the Factor Analysis of the External Environment ('new' and 'old' universities)



Importance represented by a value of 0.5 or higher from the rotated component matrix

Appendix 24: Factor Analysis of the External Environment (business department)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.6034	19.1806	19.1806	3.4957	14.5655	14.5655
2	3.0951	12.8964	32.0770	2.7786	11.5775	26.1430
3	2.6775	11.1561	43.2331	2.5022	10.4257	36.5687
4	2.4408	10.1702	53.4033	2.1085	8.7853	45.3540
5	2.1423	8.9262	62.3295	1.9987	8.3277	53.6817
6	1.4819	6.1744	68.5039	1.9919	8.2997	61.9814
7	1.3533	5.6385	74.1425	1.9496	8.1235	70.1048
8	1.2335	5.1396	79.2821	1.9161	7.9839	78.0888
9	1.1764	4.9018	84.1838	1.4628	6.0951	84.1838
10	0.7074	2.9474	87.1313			
11	0.5850	2.4377	89.5689			
12	0.5187	2.1613	91.7303			
13	0.4644	1.9348	93.6651			
14	0.3574	1.4890	95.1542			
15	0.2919	1.2164	96.3706			
16	0.2539	1.0580	97.4286			
17	0.1498	0.6240	98.0525			
18	0.1399	0.5831	98.6356			
19	0.1148	0.4785	99.1141			
20	0.0735	0.3061	99.4202			
21	0.0667	0.2780	99.6983			
22	0.0403	0.1678	99.8660			
23	0.0197	0.0823	99.9483			
24	0.0124	0.0517	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

	Component								
	1	2	3	4	5	6	7	8	9
Q1i Change of delivery of u/g course	-0.094	-0.087	-0.095	0.884	-0.218	-0.001	0.122	0.158	0.052
Q1ii Change of delivery of p/g course	0.436	-0.018	0.241	0.643	0.338	0.049	-0.287	0.089	-0.030
Q2i Use of IT to deliver u/g courses	-0.042	0.185	0.021	0.122	-0.098	0.089	-0.140	0.896	-0.058
Q2ii Use of IT to deliver p/g courses	0.172	-0.222	0.156	-0.181	0.110	-0.076	-0.821	0.232	0.088
Q3i Entry details in terms of 'A' Level points for u/g	0.173	0.222	0.103	0.043	-0.007	-0.095	0.033	0.087	0.857
Q3iib Age profile of u/g	-0.102	-0.098	-0.050	-0.012	-0.843	-0.017	0.086	0.163	0.069
Q3iib Age profile of p/g	-0.129	-0.229	0.272	-0.625	-0.470	0.097	-0.073	0.218	0.137
Q3iiia Geographic catchment area of u/g	0.405	0.001	0.098	-0.196	0.192	-0.191	0.735	-0.009	0.109
Q3iiib Geographic catchment area of p/g	0.306	-0.004	-0.178	-0.548	0.070	-0.149	0.363	0.430	-0.308
Q3iva Application rate for places on u/g	0.683	0.249	-0.001	0.150	-0.359	-0.009	0.025	-0.116	0.223
Q3ivb Application rate for places on p/g	0.767	-0.058	0.062	-0.233	0.004	-0.373	0.017	0.189	0.266
Q4i Financial incentives offered to students to study on u/g courses	0.231	-0.135	0.860	-0.117	0.099	0.221	-0.062	-0.031	-0.047
Q4ii Financial incentives offered to students to study on p/g courses	0.135	-0.027	0.919	0.042	-0.108	-0.222	-0.007	-0.028	0.036
Q5i Change of range of u/g courses	0.057	-0.021	-0.179	-0.037	0.036	0.864	-0.022	0.049	-0.096
Q5ii Change of range of p/g courses	0.829	0.079	0.202	0.049	0.090	0.211	-0.143	0.156	0.149
Q5iii Change of range of other courses	-0.059	-0.522	-0.052	0.115	0.114	0.585	-0.154	0.051	0.176
Q5iv Change of range of electives on u/g courses	0.522	0.270	0.180	-0.001	-0.026	0.544	0.229	-0.264	-0.170
Q5v Change of range of electives on p/g courses	0.810	0.299	0.247	0.018	0.131	0.106	0.163	0.003	-0.210
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.182	0.884	0.073	-0.039	0.039	0.101	0.158	0.063	0.159
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	0.052	0.907	-0.074	0.071	0.055	-0.069	0.123	0.172	-0.010
Q6iiia Change of research requirements in terms of age profile of students registering for research	-0.246	0.082	0.033	0.094	0.332	0.107	0.111	-0.731	-0.351
Q6iiib Change of research requirements in terms of number of students registering for research	-0.254	0.015	0.119	-0.097	0.692	0.109	0.478	-0.123	0.250
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research	0.074	0.067	0.676	-0.003	0.193	-0.417	0.020	0.051	0.211
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	0.187	0.660	-0.207	-0.013	0.141	-0.098	-0.251	-0.150	0.262

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a

Rotation converged in 25 iterations.

Appendix 25: Factor Analysis of the External Environment (non-business department)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.3553	22.3139	22.3139	3.3340	13.8917	13.8917
2	2.9836	12.4316	34.7456	2.8814	12.0060	25.8977
3	2.6076	10.8649	45.6105	2.5600	10.6667	36.5644
4	2.4723	10.3012	55.9117	2.3950	9.9791	46.5436
5	1.8446	7.6860	63.5977	1.9984	8.3265	54.8700
6	1.5633	6.5139	70.1115	1.8618	7.7573	62.6274
7	1.3088	5.4535	75.5650	1.6133	6.7219	69.3493
8	1.2419	5.1745	80.7395	1.5612	6.5050	75.8543
9	1.1052	4.6049	85.3444	1.5567	6.4862	82.3405
10	0.8193	3.4136	88.7580	1.5402	6.4175	88.7580
11	0.7492	3.1218	91.8798			
12	0.4609	1.9203	93.8001			
13	0.4004	1.6685	95.4687			
14	0.3052	1.2716	96.7402			
15	0.2739	1.1414	97.8816			
16	0.2279	0.9496	98.8312			
17	0.1437	0.5987	99.4300			
18	0.0726	0.3026	99.7326			
19	0.0531	0.2215	99.9540			
20	0.0110	0.0460	100.0000			
21	0.0000	0.0000	100.0000			
22	0.0000	0.0000	100.0000			
23	0.0000	0.0000	100.0000			
24	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

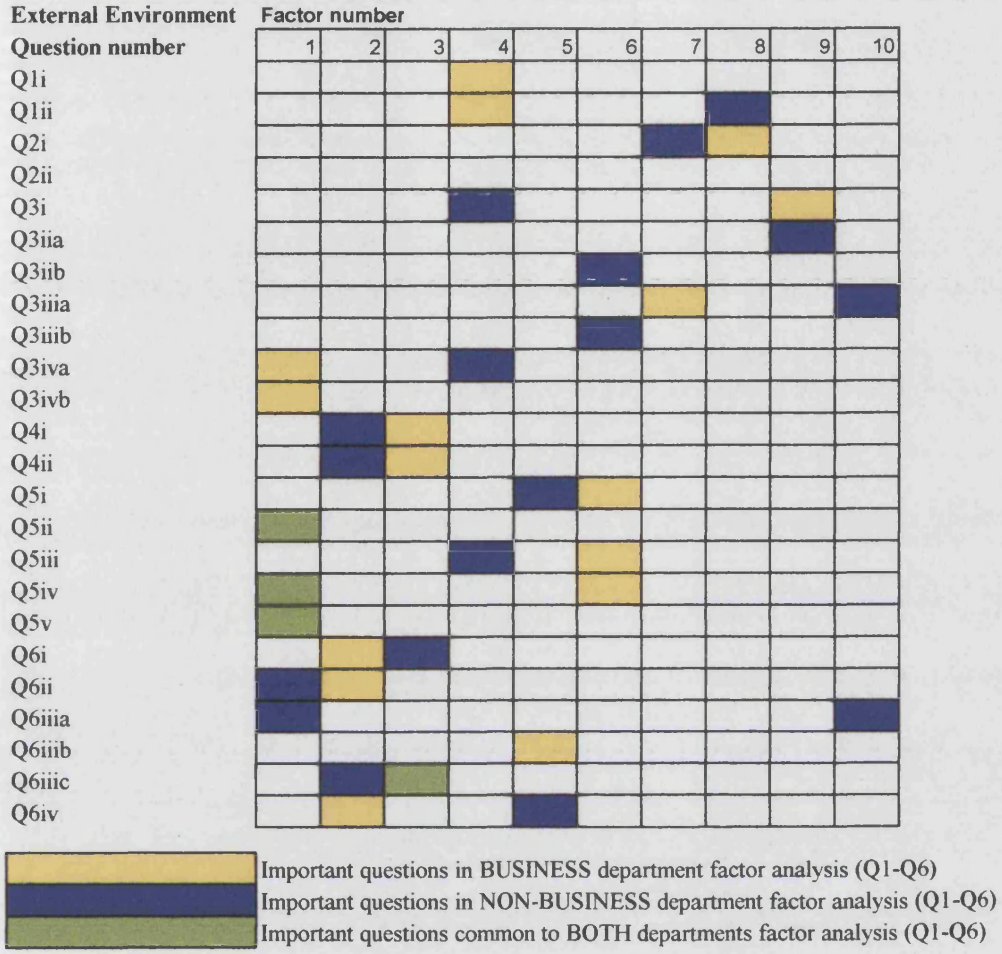
	Component									
	1	2	3	4	5	6	7	8	9	10
Q1i Change of delivery of u/g course	0.012	0.011	-0.866	-0.088	0.047	0.108	0.245	0.221	-0.097	-0.129
Q1ii Change of delivery of p/g course	0.063	-0.097	-0.117	-0.004	-0.078	0.097	-0.022	0.928	0.114	0.080
Q2i Use of IT to deliver u/g courses	0.080	-0.142	-0.210	0.129	0.091	-0.026	0.913	-0.042	-0.053	-0.016
Q2ii Use of IT to deliver p/g courses	0.033	-0.712	-0.034	0.108	-0.020	-0.082	0.462	0.237	-0.022	0.316
Q3i Entry details in terms of 'A' Level points for u/g	-0.063	0.063	0.180	0.873	0.020	0.035	-0.148	-0.064	-0.088	-0.077
Q3iib Age profile of u/g	0.140	0.089	0.064	-0.004	-0.054	0.144	-0.029	0.086	0.879	-0.032
Q3iib Age profile of p/g	0.100	-0.042	0.053	0.099	-0.055	0.804	-0.033	0.186	0.245	0.170
Q3iiia Geographic catchment area of u/g	-0.086	-0.058	0.163	0.011	-0.022	0.244	0.062	0.083	0.032	0.897
Q3iiib Geographic catchment area of p/g	-0.054	0.142	-0.382	-0.063	-0.420	0.649	-0.025	-0.174	-0.085	0.373
Q3iva Application rate for places on u/g	-0.149	-0.050	-0.349	0.623	0.304	0.082	0.333	-0.079	0.337	0.062
Q3ivb Application rate for places on p/g	0.036	-0.761	0.129	-0.101	0.178	0.440	0.114	0.159	-0.186	0.056
Q4i Financial incentives offered to students to study on u/g courses	0.230	0.562	0.288	0.181	0.031	0.079	-0.321	0.252	0.439	0.075
Q4ii Financial incentives offered to students to study on p/g courses	0.279	0.888	0.154	-0.187	0.032	0.139	0.087	-0.008	-0.069	0.117
Q5i Change of range of u/g courses	0.180	0.126	-0.074	0.000	0.877	0.102	-0.011	-0.032	-0.363	0.012
Q5ii Change of range of p/g courses	0.796	-0.162	0.043	-0.094	0.087	0.321	0.123	0.034	0.039	-0.052
Q5iii Change of range of other courses	0.214	-0.171	0.266	0.707	-0.108	0.076	0.234	0.067	0.070	0.053
Q5iv Change of range of electives on u/g courses	0.754	0.318	0.296	-0.187	0.222	-0.013	0.029	-0.113	0.167	0.032
Q5v Change of range of electives on p/g courses	0.806	0.178	0.011	0.145	-0.039	-0.090	0.004	0.354	0.047	-0.127
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.495	0.168	0.609	0.367	0.098	0.229	0.050	-0.131	0.039	-0.090
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	0.638	0.303	0.303	0.026	0.065	-0.239	-0.022	-0.360	0.269	0.232
Q6iiia Change of research requirements in terms of age profile of students registering for research	0.586	0.092	-0.307	-0.044	0.106	0.002	-0.318	-0.022	-0.221	0.563
Q6iiib Change of research requirements in terms of number of students registering for research	0.267	0.082	0.388	-0.642	0.082	0.413	-0.218	-0.243	0.037	-0.085
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research	0.355	0.510	0.648	0.049	-0.031	0.054	-0.103	0.236	0.008	0.051
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	0.053	-0.155	0.031	-0.001	0.894	-0.221	0.101	-0.085	0.212	-0.006

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a

Rotation converged in 19 iterations.

Appendix 26: Graphical summary of External Environment Factor Analysis (business and non-business departments)



Importance represented by a value of 0.5 or higher from the rotated component matrix

Appendix 27: Configuration of the Multi-Dimensional Scaling analysis in six dimensions (External Environment Q1-Q6)

Iteration history for the 6 dimensional solution (in squared distances)

Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1	0.14724	
2	0.10888	0.03836
3	0.10634	0.00254
4	0.10558	0.00076

Iterations stopped because
S-stress improvement is less than .001000

Stress and squared correlation (RSQ) in distances

RSQ values are the proportion of variance of the scaled data (disparities)
in the partition (row, matrix, or entire data) which
is accounted for by their corresponding distances.
Stress values are Kruskal's stress formula 1.

For matrix
Stress = .07659 RSQ = .95158

Configuration derived in 6 dimensions

Stimulus Coordinates

Stimulus Number	Stimulus Name	Dimension 1	2	3	4	5	6
1	VAR1	1.7336	0.5141	-1.4755	2.3617	0.6387	0.3206
2	VAR2	-2.521	-0.6452	-1.5627	0.535	-0.8586	-0.2634
3	VAR3	-0.6058	-0.0504	-0.1958	-0.596	0.9647	-0.6154
4	VAR4	-0.6824	0.8303	0.9388	-0.3106	-1.2231	-0.0627
5	VAR5	2.2583	1.0315	-0.6593	1.7474	0.308	1.1126
6	VAR6	-1.6352	0.6861	0.0705	-1.4397	1.4779	-0.7134
7	VAR7	0.9773	-1.3988	0.6518	-0.9591	-0.4861	-0.0686
8	VAR8	0.4137	-0.6929	0.3834	-0.3167	-0.2732	-1.2005
9	VAR9	0.7372	-0.0284	-0.523	0.6942	-1.7302	-0.1192
10	VAR10	0.7054	-0.6244	-0.9256	-1.3269	1.4958	0.7755
11	VAR11	-1.3498	1.03	0.4261	-0.3099	-0.7866	-0.5261
12	VAR12	-2.3653	0.5968	0.4122	0.5345	0.6967	0.1631
13	VAR13	-0.9653	0.9041	-1.4577	-0.9227	-0.3807	-0.8372
14	VAR14	-0.0073	-1.7254	-1.6249	0.8423	0.8816	0.5368
15	VAR15	-0.54	-0.2783	-1.9261	-0.006	-0.6552	0.6591
16	VAR16	-0.6881	0.1287	-0.7585	-0.0274	-0.3195	-0.8575
17	VAR17	0.078	0.3147	-0.2505	-0.4948	-0.9809	-1.3955
18	VAR18	-0.8647	-1.5284	-1.7761	-0.2361	0.1699	-0.876
19	VAR19	5.1529	-0.6132	1.0607	-1.1021	-0.885	-1.4721
20	VAR20	-1.6576	0.6721	-0.0592	1.019	-0.7909	0.4612
21	VAR21	0.9559	-0.8361	1.2696	0.8148	0.1383	-0.558
22	VAR22	0.1161	0.5988	-0.698	-0.442	-0.7177	-0.5926
23	VAR23	-1.3064	0.738	-0.3442	0.7152	0.0806	0.6154
24	VAR24	-0.4245	1.3334	-0.0651	-1.1971	1.0681	0.0792
25	VAR25	0.3799	-0.2081	-0.3096	-1.0897	-0.0274	2.1131
26	VAR26	-0.6441	-1.2254	-0.8313	-2.1414	-0.709	0.1495
27	VAR27	1.387	-2.5016	-1.2666	0.2494	-0.0572	-0.4673
28	VAR28	-0.3323	-1.8845	2.4724	0.6624	-1.1068	0.486
29	VAR29	-0.2322	0.0162	-0.0191	-0.1847	-0.4866	0.1261
30	VAR30	-0.5179	-0.7466	0.2803	0.0833	-0.2197	0.1053
31	VAR31	-0.9466	-0.7824	0.3101	0.8331	0.021	0.3443
32	VAR32	-2.1734	1.2953	0.6367	0.6262	0.2808	0.1395
33	VAR33	0.9799	0.4319	0.9506	0.0025	-0.3779	0.3551
34	VAR34	-0.8447	-0.0115	0.4604	0.4223	-0.415	-0.7289
35	VAR35	1.6112	1.4818	-1.1613	0.3676	0.8954	0.1407
36	VAR36	-0.7151	0.6667	-0.2619	-0.4428	0.045	-0.1122
37	VAR37	0.1018	-1.0858	1.229	1.0666	-1.1909	0.7621
38	VAR38	-1.1052	0.5595	1.6714	0.5972	0.0667	-0.4835
39	VAR39	3.0771	3.5817	-1.2524	-0.0874	-1.7727	-0.0798
40	VAR40	-0.8337	0.5885	0.3689	0.0919	0.3143	-0.2381
41	VAR41	0.1643	-0.7784	0.221	-0.2155	1.1944	0.3327
42	VAR42	-0.6101	-1.3646	-0.3492	1.3894	-0.1263	0.0751

43 VAR43	1.8171	0.9198	0.6759	-0.5682	0.3123	-0.1154
44 VAR44	0.9264	1.0789	1.4006	1.0687	2.7226	-1.5409
45 VAR45	0.7078	-0.0027	-0.3784	1.2453	0.4992	-0.264
46 VAR46	-0.2485	0.5589	0.4695	0.8776	0.0897	0.2783
47 VAR47	1.4088	-1.3863	0.3057	-0.4697	0.9441	-0.3652
48 VAR48	0.1779	-0.8806	0.5122	0.2276	0.4978	-0.0343
49 VAR49	-0.4987	1.2956	0.3149	-1.0746	-0.0185	1.6631
50 VAR50	0.6124	-0.0512	0.1674	-1.1509	0.4894	0.7413
51 VAR51	-1.4249	-0.4215	1.5997	-0.7873	0.4057	0.0064
52 VAR52	0.2605	-0.1007	0.8721	-1.1758	-0.1031	2.0456

Appendix 28: Summary of statistically significant variables in the external environment MDS (Q1-Q6) configuration using ProFit and Logit regression at the 0.1 significant level

ProFit Regression (Likert Scale)	
Significant Question	Dimension
Q1i	1,2,3,5
Q1ii	1,2,3,4,5,6
Q2i	2
Q2ii	2,4,6
Q3i	1,2,3,4,5
Q3iia	6
Q3iib	4
Q3iiia	1,3,4
Q3iiib	2,3,4
Q3iva	1,2,3,4,6
Q3ivb	1,2,3,4,5,6
Q4i	1,2,3,4,5,6
Q4ii	1,2,4,5,6
Q5i	1,3,5
Q5ii	1,4,5,6
Q5iii	2,3
Q5iv	1,2,3,4,5,6
Q5v	1,4
Q6i	1,4,5,6
Q6ii	1,2,4,5,6
Q6iiia	2,3
Q6iiib	2,6
Q6iiic	1,2,4,5
Q6iv	1,2,4,6

Logit Regression	
Significant Question	Dimension
Q20ai-c	3
Q20aii-c	1,2,5
Q20bi-c	1
Q20bii-c	4
Q20biv-c	4
Q22i	3
Q24v-c	6
Q27i-c	5
Q27ii-c	3,4
Q30ai-c	2,5,6
Q30aii-c	2,4,5
Q30aiii-c	4
Q30aivc	4
Q31aii-c	3
Q31b-c	3
Q33a	6
Q33b	2
Q34	1
University Status (old/ new)	4,5,6
Department Category (business/ non-business)	2,3,5

Appendix 29: Factor Analysis of the Broader Contingent Factor Analysis ('new' universities)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.1827	21.6896	21.6896	10.7440	15.3486	15.3486
2	9.0619	12.9456	34.6352	9.0021	12.8602	28.2087
3	5.8391	8.3416	42.9768	5.4616	7.8023	36.0110
4	5.2294	7.4706	50.4474	4.1302	5.9002	41.9112
5	4.4979	6.4256	56.8730	4.0377	5.7681	47.6793
6	3.6033	5.1476	62.0206	3.3576	4.7966	52.4759
7	3.4290	4.8986	66.9192	3.2796	4.6851	57.1611
8	3.2823	4.6890	71.6083	2.9250	4.1786	61.3397
9	2.7464	3.9234	75.5317	2.9208	4.1726	65.5122
10	2.1973	3.1389	78.6706	2.4677	3.5252	69.0375
11	2.0883	2.9833	81.6540	2.4434	3.4906	72.5281
12	1.5848	2.2639	83.9179	2.3019	3.2884	75.8165
13	1.5407	2.2010	86.1189	2.3002	3.2860	79.1026
14	1.2426	1.7751	87.8940	2.1682	3.0974	82.2000
15	1.1156	1.5938	89.4878	1.9803	2.8291	85.0291
16	1.0353	1.4790	90.9668	1.9464	2.7805	87.8096
17	0.9295	1.3278	92.2946	1.9128	2.7326	90.5422
18	0.9020	1.2885	93.5831	1.7389	2.4842	93.0264
19	0.8091	1.1559	94.7390	1.1989	1.7127	94.7390
20	0.6835	0.9764	95.7154			
21	0.6218	0.8884	96.6038			
22	0.5408	0.7726	97.3764			
23	0.4413	0.6304	98.0067			
24	0.3855	0.5507	98.5574			
25	0.3241	0.4630	99.0204			
26	0.2749	0.3927	99.4131			
27	0.2243	0.3205	99.7336			
28	0.1865	0.2664	100.0000			
29	0.0000	0.0000	100.0000			
30	0.0000	0.0000	100.0000			
31	0.0000	0.0000	100.0000			
32	0.0000	0.0000	100.0000			
33	0.0000	0.0000	100.0000			
34	0.0000	0.0000	100.0000			
35	0.0000	0.0000	100.0000			
36	0.0000	0.0000	100.0000			
37	0.0000	0.0000	100.0000			
38	0.0000	0.0000	100.0000			
39	0.0000	0.0000	100.0000			
40	0.0000	0.0000	100.0000			
41	0.0000	0.0000	100.0000			
42	0.0000	0.0000	100.0000			
43	0.0000	0.0000	100.0000			
44	0.0000	0.0000	100.0000			
45	0.0000	0.0000	100.0000			
46	0.0000	0.0000	100.0000			
47	0.0000	0.0000	100.0000			
48	0.0000	0.0000	100.0000			
49	0.0000	0.0000	100.0000			
50	0.0000	0.0000	100.0000			
51	0.0000	0.0000	100.0000			
52	0.0000	0.0000	100.0000			
53	0.0000	0.0000	100.0000			
54	0.0000	0.0000	100.0000			
55	0.0000	0.0000	100.0000			
56	0.0000	0.0000	100.0000			
57	0.0000	0.0000	100.0000			
58	0.0000	0.0000	100.0000			
59	0.0000	0.0000	100.0000			
60	0.0000	0.0000	100.0000			
61	0.0000	0.0000	100.0000			
62	0.0000	0.0000	100.0000			
63	0.0000	0.0000	100.0000			
64	0.0000	0.0000	100.0000			
65	0.0000	0.0000	100.0000			
66	0.0000	0.0000	100.0000			
67	0.0000	0.0000	100.0000			
68	0.0000	0.0000	100.0000			
69	0.0000	0.0000	100.0000			
70	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

	Component																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Q1i Change of delivery of u/g course	-0.284622	-0.410379	-0.03021	0.300647	0.10127	-0.475381	-0.024218	-0.054985	-0.107823	0.113233	0.333551	-0.338458	0.097242	0.006885	-0.209729	-0.111961	0.008678	-0.218009	0.038662
Q1ii Change of delivery of p/g course	-0.097417	0.135847	-0.043583	0.243535	0.192784	0.023143	0.068977	-0.134365	0.154458	0.854271	-0.025734	-0.140341	-0.037477	0.093504	-0.018549	-0.067182	-0.143754	-0.024533	0.016612
Q2i Use of IT to deliver u/g courses	0.184524	0.300069	-0.071641	0.059339	-0.006994	-0.883989	0.002611	-0.050691	-0.064282	0.075433	-0.010839	0.032365	-0.022496	-0.03181	0.059151	0.066555	-0.030039	-0.061297	-0.038588
Q2ii Use of IT to deliver p/g courses	0.364131	0.176704	-0.266701	-0.072056	-0.089293	-0.363562	-0.086328	-0.421225	0.210194	0.367837	-0.276872	-0.059514	-0.101109	-0.015155	0.27992	-0.0538	-0.135145	-0.03657	0.056085
Q3i Entry details in terms of 'A' Level points for u/g	0.012955	0.109718	-0.134065	0.292045	-0.025763	-0.187946	-0.154348	-0.025644	-0.067569	-0.119742	0.086359	0.847017	0.021925	0.026993	0.011424	0.040296	-0.015873	-0.0227	0.025889
Q3ii Entry details in terms of 'A' Level points for p/g	-0.141443	-0.178473	0.103669	0.128698	-0.148335	-0.101185	0.105685	0.19532	0.020745	-0.100884	0.098417	0.010865	-0.138762	0.003689	0.139838	0.842204	0.025868	-0.096558	0.002763
Q3iia Geographic catchment area of u/g	0.095037	-0.063084	0.135221	0.112139	0.167472	-0.104377	-0.186782	0.133127	0.229589	0.018774	0.004239	0.005344	0.000126	0.07434	0.858	0.15141	0.124154	-0.111719	-0.009067
Q3iib Geographic catchment area of p/g	0.326696	0.309599	0.043579	-0.015124	0.402486	0.282822	-0.175974	0.125647	-0.228531	-0.013746	0.559197	0.022738	-0.021974	-0.003112	-0.009917	-0.049562	0.068478	-0.1022	0.283857
Q3iva Application rate for places on u/g	0.17741	0.391865	-0.012471	-0.087893	0.331805	0.063392	-0.029041	-0.010698	-0.0984	-0.086264	0.057982	-0.011835	-0.087144	0.138756	0.13806	0.05345	0.73028	-0.121781	-0.029835
Q3ivb Application rate for places on p/g	0.013182	0.143265	-0.228374	-0.106236	0.154574	-0.120725	0.161907	0.028976	-0.120067	0.006795	0.848271	0.099148	-0.063534	0.022859	-0.002823	0.104582	-0.010761	0.09798	-0.053369
Q4i Financial incentives offered to students to study on u/g courses	0.344201	0.15743	-0.495895	-0.007764	0.221658	0.001437	-0.005937	0.006717	0.175942	0.125745	0.320858	0.304801	-0.029104	0.109968	0.218623	0.142571	0.383859	0.190546	-0.049878
Q4ii Financial incentives offered to students to study on p/g courses	0.040048	0.305001	0.519628	-0.117151	-0.098085	0.445213	-0.043941	0.1169	0.08344	0.290391	-0.144129	0.01104	0.206982	0.072324	0.409065	0.097332	-0.045726	-0.059897	0.019197
Q5i Change of range of u/g courses	-0.338165	0.31031	0.734735	-0.086824	0.062087	0.114525	0.048166	0.110988	-0.082458	-0.165449	-0.002163	-0.182987	-0.032116	0.045141	0.170737	-0.084508	-0.067956	-0.055514	-0.026707
Q5ii Change of range of p/g courses	-0.091379	0.219525	-0.011128	-0.108756	0.157555	0.094732	0.252956	0.009297	0.058876	-0.162661	-0.019811	-0.046566	0.830565	0.076378	0.022689	-0.133757	-0.182913	0.053255	-0.095856
Q5iii Change of range of other courses	0.13653	0.322988	0.096108	0.195836	0.12773	0.193098	0.290706	0.179917	-0.053687	0.046835	0.020806	0.129641	0.011401	0.746217	0.07795	0.083846	0.128613	0.066295	0.036684
Q5iv Change of range of electives on u/g courses	0.157433	-0.094407	-0.01436	0.085726	0.042582	0.042148	0.007753	0.102987	0.832279	0.0262	-0.08516	-0.075958	0.153899	0.046124	0.150131	0.00561	-0.111731	-0.298817	0.048126
Q5v Change of range of electives on p/g courses	0.073149	0.393403	0.288017	0.233023	0.1442	0.584479	0.182727	0.310677	-0.112933	-0.057253	0.062257	-0.207046	0.02935	0.063682	-0.027089	0.158226	-0.129789	0.059723	-0.194007
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.086085	0.532306	0.042772	0.039472	0.170385	0.41616	0.071975	0.230263	-0.170944	0.323849	0.253959	-0.025304	-0.169971	0.226736	-0.083107	0.008621	0.161998	0.130772	-0.184813
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	0.089455	0.307254	0.224221	0.233937	0.299625	0.216525	0.177497	0.310859	-0.143989	-0.076981	0.055596	0.56527	-0.287347	0.074777	-0.067816	-0.069596	-0.044455	0.246425	-0.028951
Q6iia Change of research requirements in terms of age profile of students registering for research	-0.065455	0.314778	0.223881	0.221022	0.240913	0.214057	-0.08767	0.203844	-0.410613	-0.083487	0.028866	0.254564	-0.368514	0.005386	-0.205567	0.044719	-0.137	0.366371	0.05117
Q6iib Change of research requirements in terms of age profile of students registering for research	-0.384464	0.009666	-0.029353	0.196474	0.144463	0.631192	0.030682	-0.19727	-0.046974	0.065306	-0.150625	-0.265464	0.044126	0.088087	-0.067987	-0.410424	-0.15275	-0.012369	0.118163
Q6iic Change of research requirements in terms of number of students registering for research	0.014764	0.152099	0.476851	0.226637	0.157387	0.425788	0.03659	0.3837	0.043824	0.047942	-0.335777	0.128914	0.006444	-0.058277	-0.207242	-0.156029	-0.176335	0.157774	0.089565
Q6iii Change of research requirements in terms of financial incentives offered to students registering for research	0.071418	0.142898	0.827726	0.076109	0.070895	0.215425	0.073968	0.047899	-0.176302	0.160162	-0.0417	0.125719	-0.095059	0.11372	0.120005	0.097743	-0.053314	0.023193	0.078443
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	0.229684	-0.06877	-0.079376	0.055981	0.198401	0.098805	0.086521	0.066072	-0.280906	0.019605	0.070515	0.01343	0.03138	0.00428	-0.08725	-0.118191	-0.08011	0.857602	-0.022547
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses	0.144003	0.291918	0.230101	-0.168006	0.512298	-0.06581	0.131436	0.201884	0.100636	0.179466	0.027894	-0.279081	0.056333	-0.184754	-0.124837	-0.256076	0.328491	0.004017	-0.330019
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses	0.242363	-0.071357	0.133805	-0.145665	0.328597	-0.138455	0.176386	0.238571	-0.080909	0.706969	0.076509	-0.020878	-0.171123	-0.112528	0.09781	-0.089583	0.264721	0.072087	-0.025897
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding	0.08956	0.012491	0.181147	0.058499	0.84256	0.00789	0.050072	0.14471	0.037196	0.080628	0.044727	0.24304	-0.033974	0.00911	0.083567	-0.282793	0.057219	0.100508	0.000896
Q7iv The amount of formal developmental market research undertaken as to identify sources of external funding	0.111561	0.03957	-0.00109	-0.061076	0.779501	0.12192	0.208556	0.158368	0.191384	0.276786	0.092596	-0.093602	0.093466	0.210941	0.140993	0.002953	0.031707	0.114643	0.044431
Q8i The amount of internal market research undertaken as to students views of u/g courses	0.05111	0.071101	-0.067607	-0.023281	0.236993	-0.119709	0.846709	-0.0212	0.129627	-0.103934	0.125605	-0.14006	0.162776	-0.18312	-0.163831	0.050435	-0.021024	0.080038	0.008648
Q8ii The amount of internal market research undertaken as to students views of p/g courses	0.234595	-0.014194	0.393848	0.069002	0.035077	0.0745	0.695716	-0.106599	-0.146863	0.208622	-0.006386	0.101495	0.006431	0.220685	0.04314	-0.030509	-0.065094	0.284083	0.235689
Q8iii The amount of internal market research undertaken as to students requirements of the university	0.109421	-0.072813	0.003012	-0.026184	0.177729	0.12364	0.897017	-0.035129	0.00171	0.148212	0.017883	-0.049246	0.065322	0.182767	-0.042527	0.042437	0.027606	-0.087694	-0.122721
Q9i Changes in the investment in marketing activity by the university	0.474131	-0.092478	0.198113	-0.604567	0.008874	-0.013868	0.088267	-0.018766	0.006345	0.28981	0.122257	-0.249573	0.248018	-0.133563	-0.037025	0.149712	-0.130868	0.08494	-0.145389
Q9ii Changes in the investment in marketing activity by an external body on behalf of the university	-0.057737	-0.239232	0.822	-0.196836	0.093318	-0.029385	0.037251	-0.114114	0.13811	0.083589	-0.05639	-0.151067	0.007587	-0.001945	-0.013044	0.100806	0.042993	0.039991	-0.215287
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision	-0.104305	0.395714	0.110198	-0.267755	0.652516	-0.180276	0.293775	-0.213327	-0.20898	0.062854	0.020211	-0.007974	0.094618	0.048184	0.127298	0.044003	-0.000363	0.055703	-0.007307
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research	-0.095554	0.14171	0.300082	0.13598	0.466853	0.088145	0.398334	-0.150246	-0.189805	0.080315	-0.131231	0.056476	-0.104459	0.237243	-0.125155	0.088677	0.242609	0.368969	0.223693
Q11 Impact of market research in the degree of change as indicated in Q1 - Q5	-0.158256	0.079512	-0.365223	-0.054372	0.697585	0.193595	0.182222	0.12369	-0.12698	0.042238	0.277215	-0.133552	0.15639	-0.053495	-0.12139	0.182658	0.130431	0.001591	-0.053673
Q13ia.90 Influence over the appointment of full time academic staff early 1990s/ 1999	0.832092	-0.08031	-0.055732	0.040563	-0.091395	0.163407	0.268741	0.208208	-0.090286	-0.152882	-0.000558	-0.010376	0.118381	0.172851	0.089184	-0.143899	0.075838	-0.04784	-0.027921
Q13ia.99 Influence over the appointment of full time academic staff in 1999	0.213163	0.782378	-0.106637	0.16543	0.044861	0.022844	0.063011	-0.053508	-0.050518	0.05303	0.204309	0.029196	0.135079	0.295955	0.14728	-0.189436	0.052879	0.188162	0.164049
Q13ib.90 Influence over the appointment of part time academic staff early 1990s	0.494066	0.286714	-0.370408	0.077734	-0.022205	-0.068342	0.024716	0.301	-0.107948	0.002636	-0.23188	-0.053475	0.234953	-0.006464	-0.133723	-0.275397	0.222017	-0.035007	0.110469
Q13ib.99 Influence over the appointment of part time academic staff in 1999	0.171959	0.800124	-0.213396	0.201038	0.066668	0.183185	0.019122	0.089148	0.091715	-0.007217	0.00913	-0.050473	0.030072	0.05723	-0.203351	-0.096841	0.01381	0.02013	0.332178
Q13ii.90 Influence over appointing administrative staff early 1990s	0.654657	0.179702	-0.14866	0.233289	-0.022682	0.099406	0.051157	0.462396	-0.150807	-0.085983	0.218316	0.075908	0.063783	0.138594	0.020458	-0.177054	0.11182	-0.113039	0.046972
Q13ii.99 Influence over appointing administrative staff in 1999	0.073824	0.832094	0.026966	0.090627	0.14946	-0.025251	-0.172166	0.295818	0.174278	-0.057055	0.104697	-0.14552	-0.016134	0.234397	0.03852	-0.025204	0.000188	-0.068737	-0.072168
Q13iii.90 Influence over appointing support services (external to the university) early 1990s	0.440758	-0.025693	0.076943	0.254819	0.184803	0.057873	-0.070908	0.748776	0.098698	-0.028267	-0.061103	0.043632	0.046997	0.059884	0.05767	0.192014	-0.048335	0.126489	-0.109045
Q13iii.99 Influence over appointing support services (external to the university) in 1999	0.089477	0.322267	0.053191	0.040885	0.171835	0.07451	-0.190519	0.722047	0.292423	0.068937	0.090978	0.005295	-0.036892	0.033814	0.267871	0.210042	0.051056	-0.03688	0.111933
Q13iv.90 Influence over the amount of remission on teaching to academic staff for research / administration early 1990s	0.675656	0.120744	0.049761	0.059903	0.047752	-0.147877	-0.295662	0.22447	-0.15354	-0.070595	-0.263315	-0.104439	0.16231	0.028863	0.094574	-0.176157	0.217326	0.07759	0.1212
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration in 1999	-0.035954	0.485261	0.61043	-0.036087	-0.131458	0.204862	-0.014869	0.20543	-0.119676	-0.260891	-0.14987	-0.043113	0.032875	-0.04346	-0.064243	0.150633	0.194038	-0.061314	0.182521
Q14i.90 Approval to invest in IT for academic activities early 1990s	0.868448	0.115099	-0.044229	0.034854	0.107498	-0.080419	0.112001	-0.067297	-0.099249	0.278468	-0.033783	0.100988	-0.052308	-0.199687	-0.017848	0.017718	0.073381	-0.077432	-0.09541
Q14i.99 Approval to invest in IT for academic activities in 1999	0.053793	0.69346	0.328028	0.283505	0.043887	-0.108102	0.090015	-0.189203	-0.13939	0.031896	-0.147632	0.220371	0.132462	0.140503	-0.20539	-0.122166	0.111053	-0.062426	0.159972
Q14ii.90 Approval to invest in IT for administration early 1990s	0.768431	0.011706	0.235638	-0.036179	0.082364	-0.036583	-0.118642	-0.027434	0.12165	0.18351	-0.237626	0.035828	-0.16353	0.152415	-0.042296	0.236317	-0.005004	-0.127073	0.187989
Q14ii.99 Approval to invest in IT for administration in 1999	0.021664	0.536567	0.413853	-0.022907	0.104049	-0.026409	-0.146613	-0.122532	0.092563	-0.000844	0.08258	-0.051787	0.221283	0.563299	0.036136	-0.104885	0.040852	-0.08336	-0.001632
Q15i.90 Authority for u/g course development and implementation early 1990s	0.713103	0.02738	-0.157345	0.489048	-0.145418	0.0389	-0.018135	-0.061797	0.108988	0.061228	0.072366	-0.1592	-0.093294	-0.260128	-0.014722	0.065593	-0.008887	0.110829	-0.201168
Q15i.99 Authority for u/g course development and implementation in 1999	0.093849	0.253164	0.027583	0.908107	-0.039405	0.012329	0.00367	0.111576	0.107568	0.083513	-0.039142	0.163956	0.01852	0.069373	0.032121	0.066129	-0.044508	0.029983	0.033025
Q15ii.90 Authority for p/g course development and implementation early 1990s	0.683524	0.028612	-0.196823	0.563783	-0.141813	-0.029661	0.09124	-0.051054	0.05944	0.035974	0.049479	-0.071962	0.015515	-0.136575	0.038666	0.015152	-0.098132	0.121836	-0.26365
Q15ii.99 Authority for p/g course development and implementation in 1999	0.111099	0.25785	0.034825	0.913756	-0.041231	0.024868	-0.004502	0.131637	0.09721	0.083045	-0.050126	0.128059	0.010762	0.07037	0.035446	0.06358	-0.028108	0.035456	0.030759
Q15iii.90 Authority for other course development and implementation early 1990s	0.545986	0.273605	-0.380538	-0.016225	-0.051307	0.07628	0.009865	0.018531	0.318612	0.105402	-0.077222	-0.203237	0.042906	-0.069023	0.075387	-0.059968	0.458853	-0.015385	0.14322
Q15iii.99 Authority for other course development and implementation in 1999	0.108872	0.354764	-0.11271	0.414463	-0.064473	0.02457	0.042261	0.107909	0.70196	0.173026	-0.151423	-0.033711	0.01906	-0.156957	0.075797	0.036817	0.11894	0.009717	-0.154472
Q16i.90 Approval of travel expenditure (UK) early 1990s	0.884457	0.261579	-0.083795	-0.037981	0.053371	-0.051912	0.081584	0.077773	0.049442	-0.027549	0.202326	0.069314	-0.033667	-0.052903	-0.085409	-0.033897	0.091568	0.096878	0.129209
Q16i.99 Approval of travel expenditure (UK) in 1999	0.221383	0.842991	-0.014909	0.149175	0.145622	-0.141338	-0.038031	0.098476	0.014808	0.031368	0.098879	0.155081	0.183065	-0.197013	-0.163072	0.03379	0.104337	0.025624	0.030513
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s	0.876786	0.20199	-0.083024	-0.045552	0.175605	0.045708	-0.080157	0.034417	0.056697	-0.059982	0.149118	0.117052	-0.030322	0.001813	-0.064996	0.021551	0.07348	0.175282	0.045392
Q16ii.99 Approval of travel expenditure (o'seas) in 1999	0.178098	0.84888	0.029674	0.119884	0.148929	-0.087507	-0.033705	0.076803	0.050355	-0.076065	0.136784	0.124057	0.213003	-0.05669	-0.071062	-0.040197	0.098338	-0.046698	-0.253718
Q16iii.90Approval of overtime expenditure early 1990s	0.640718	-0.10866	0.157007	0.197139	-0.03559	-0.349444	0.038105	0.086181	0.381528	-0.068455	-0.30399	0.103905	0.140016	0.170196	0.059099	0.079061	-0.135831	0.037188	-0.041413
Q16iii.99 Approval of overtime expenditure in 1999	-0.023958	0.393759	0.576683	0.199259	0.022082	-0.026173	-0.01501	0.136316	0.2644	-0.179281	-0.159477	0.145408	0.331376	0.308049	-0.07835	-0.095816	0.119035	-0.078667	0.152614
Q16iv.90 Approval of capital expenditures early 1990s	0.617775	0.321455	0.039505	-0.009747	-0.002129	-0.097448	-0.043585	-0.104594	0.114584	0.178615	-0.170263	0.084084	-0.182532	0.093605	0.079213	0.092375	-0.126702	0.085517	-0.056733
Q16iv.99 Approval of capital expenditures in 1999	0.148797	0.837641	0.216576	0.02037	-0.08495	0.086464	0.026167	-0.110786	-0.04694	0.200669	-0.15156	0.033009	-0.002886	0.055279	0.203395	0.122262	-0.041952	-0.020747	-0.015243
Q16v.90 Approval of conferences early 1990s	0.867154	-0.053243	-0.003306	-0.14076	-0.028514	-0.005014	-0.045817	-0.004895	0.268772	-0.168902	0.067422	-0.149537	0.208419	0.087366	-0.049207	0.006343	0.09085	0.046041	0.069801
Q16v.99 Approval of conferences in 1999	0.207063	0.536897	0.077251	0.121496	0.020756	-0.038611	0.006632	0.045032	0.214172	0.016753	-0.078665	0.011594	0.716014	0.02537	-0.030141	-0.031005	0.142379	-0.048445	0.125233
Q16vi.90 Approval of appointment of staff early 1990s	0.807524	0.10345	-0.075716	0.168948	0.000115	-0.096447	0.269872	0.185488	-0.072882	0.030403	0.154683	0.129864	-0.001664	0.018004	0.228281	-0.192443	-0.028167	-0.039719	-0.088987
Q16vi.99 Approval of appointment of staff in 1999	0.018697	0.698459	0.318246	0.114845	-0.019885	-0.09999	0.2583	0.032275	-0.080537	0.050997	0.045966	0.141609	-0.037192	0.091655	0.321889	-0.181808	0.18244	0.106427	0.248493

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a

Rotation converged in 27 iterations.

Appendix 30: Factor Analysis of the Broader Contingent Factor Analysis ('old' universities)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.8191	16.8844	16.8844	6.6213	9.4590	9.4590
2	9.4768	13.5382	30.4227	6.3399	9.0570	18.5161
3	6.8015	9.7164	40.1391	6.1158	8.7368	27.2529
4	6.4062	9.1517	49.2908	6.0551	8.6501	35.9030
5	5.0191	7.1701	56.4609	5.1990	7.4272	43.3301
6	4.6845	6.6921	63.1530	4.4100	6.3000	49.6301
7	4.2202	6.0288	69.1818	4.3291	6.1844	55.8145
8	3.3423	4.7747	73.9565	4.2230	6.0328	61.8473
9	3.1443	4.4919	78.4484	4.0080	5.7257	67.5730
10	2.8662	4.0946	82.5430	3.7109	5.3013	72.8743
11	2.4489	3.4985	86.0415	3.4130	4.8757	77.7500
12	2.2136	3.1623	89.2038	3.2122	4.5889	82.3389
13	2.0174	2.8820	92.0858	3.0530	4.3615	86.7003
14	1.6825	2.4036	94.4894	2.7424	3.9177	90.6180
15	1.3386	1.9122	96.4016	2.5804	3.6863	94.3043
16	1.2347	1.7638	98.1654	1.8660	2.6656	96.9699
17	0.8536	1.2194	99.3848	1.6904	2.4149	99.3848
18	0.4306	0.6152	100.0000			
19	0.0000	0.0000	100.0000			
20	0.0000	0.0000	100.0000			
21	0.0000	0.0000	100.0000			
22	0.0000	0.0000	100.0000			
23	0.0000	0.0000	100.0000			
24	0.0000	0.0000	100.0000			
25	0.0000	0.0000	100.0000			
26	0.0000	0.0000	100.0000			
27	0.0000	0.0000	100.0000			
28	0.0000	0.0000	100.0000			
29	0.0000	0.0000	100.0000			
30	0.0000	0.0000	100.0000			
31	0.0000	0.0000	100.0000			
32	0.0000	0.0000	100.0000			
33	0.0000	0.0000	100.0000			
34	0.0000	0.0000	100.0000			
35	0.0000	0.0000	100.0000			
36	0.0000	0.0000	100.0000			
37	0.0000	0.0000	100.0000			
38	0.0000	0.0000	100.0000			
39	0.0000	0.0000	100.0000			
40	0.0000	0.0000	100.0000			
41	0.0000	0.0000	100.0000			
42	0.0000	0.0000	100.0000			
43	0.0000	0.0000	100.0000			
44	0.0000	0.0000	100.0000			
45	0.0000	0.0000	100.0000			
46	0.0000	0.0000	100.0000			
47	0.0000	0.0000	100.0000			
48	0.0000	0.0000	100.0000			
49	0.0000	0.0000	100.0000			
50	0.0000	0.0000	100.0000			
51	0.0000	0.0000	100.0000			
52	0.0000	0.0000	100.0000			
53	0.0000	0.0000	100.0000			
54	0.0000	0.0000	100.0000			
55	0.0000	0.0000	100.0000			
56	0.0000	0.0000	100.0000			
57	0.0000	0.0000	100.0000			
58	0.0000	0.0000	100.0000			
59	0.0000	0.0000	100.0000			
60	0.0000	0.0000	100.0000			
61	0.0000	0.0000	100.0000			
62	0.0000	0.0000	100.0000			
63	0.0000	0.0000	100.0000			
64	0.0000	0.0000	100.0000			
65	0.0000	0.0000	100.0000			
66	0.0000	0.0000	100.0000			
67	0.0000	0.0000	100.0000			
68	0.0000	0.0000	100.0000			
69	0.0000	0.0000	100.0000			
70	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

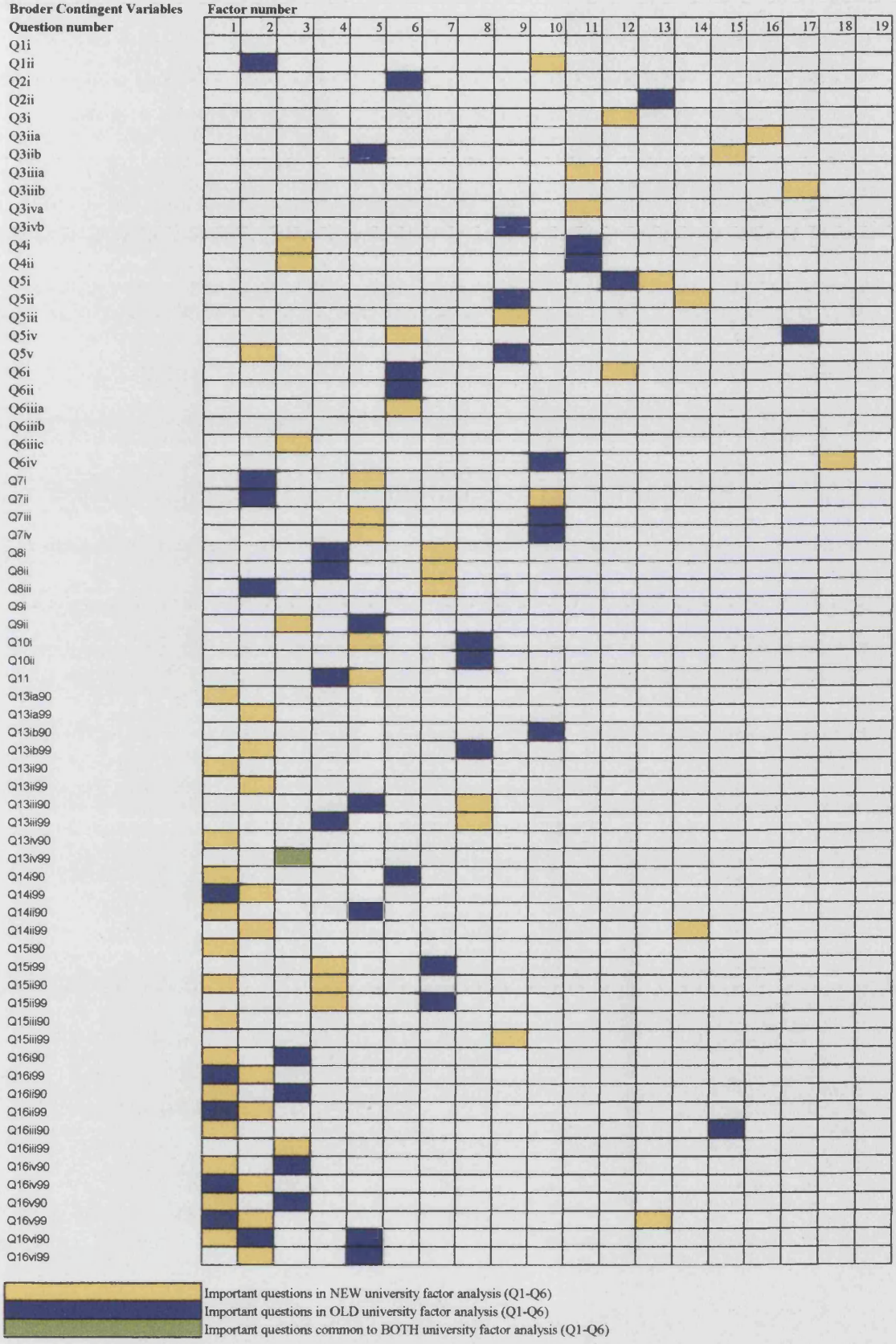
	Component																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Q1i Change of delivery of o/g course	-0.438654298	0.414072147	-0.134519503	-0.393381894	-0.414087373	-0.105116594	-0.082370138	0.08888883	-0.100731106	-0.114415489	0.165212483	0.083278487	0.213854582	-0.232828826	-0.022183374	0.188334194	0.026399915
Q1ii Change of delivery of p/g course	-0.244675652	0.634130598	0.045220903	0.07271783	-0.238164778	-0.113149756	-0.219001915	0.135154158	0.077178784	0.123464199	0.01047982	-0.080004803	0.122563979	-0.029434784	-0.183731908	-0.137852398	-0.17873421
Q1i Use of IT to deliver o/g courses	-0.099503374	0.312741212	-0.365726435	-0.442660457	0.081184437	0.045823456	-0.188436228	0.084218482	-0.032134191	0.082307845	-0.13664708	0.04067	-0.260966302	0.021288201	0.114121152	-0.123422674	0.112964902
Q2ii Use of IT to deliver p/g courses	-0.051821667	0.638838112	-0.049438855	0.226103438	0.078447874	-0.129000147	-0.442265892	0.182396394	0.236158	0.418477052	-0.158760521	-0.13845627	0.577486223	-0.079753355	0.094179216	-0.281784988	-0.014378152
Q3i Entry details in terms of 'A' Level points for o/g	-0.017586521	0.213881437	-0.080624987	0.3851 5258	-0.031580743	0.004973387	-0.287383129	-0.025082911	-0.003981436	0.278764718	0.355502584	-0.135143177	0.307294431	-0.197143577	-0.099855588	0.149281733	0.139921985
Q3ib Age profile of o/g	-0.135650197	0.022518672	0.284500469	-0.462818003	0.443782831	-0.171982871	0.009161719	0.035116844	-0.031194749	0.145712352	0.447108108	0.047782091	-0.268257879	0.265128114	-0.273903415	0.258431273	-0.027875834
Q3ib Age profile of p/g	0.057310386	-0.133334963	0.139864037	-0.022748997	0.009461187	0.103083317	0.150131073	-0.090747081	0.011874117	0.083301236	0.007773622	-0.181848524	-0.038150479	0.09190453	0.239458232	0.00710129	0.111502252
Q3iia Geographic catchment area of o/g	0.136882481	-0.137121362	-0.137982329	0.044501782	-0.026396732	-0.302899428	0.043633075	-0.139409144	0.073877148	-0.139007795	0.123883515	0.04861311	-0.837923115	-0.161543093	0.130489853	-0.102969649	-0.000321564
Q3iia Geographic catchment area of p/g	0.106815101	-0.087123019	0.178366338	-0.162387305	0.036857631	0.034825237	0.367341786	0.087295852	0.025539153	-0.219078848	-0.303272941	0.189729532	-0.541780092	0.044063267	-0.09194429	0.132961218	-0.182312987
Q3iia Application rate for places on o/g	0.078110522	0.354453573	0.381186418	0.223.3562	0.004913848	-0.090188648	0.087182764	-0.275877301	0.116789152	0.277341538	0.336818928	0.407691222	0.398600635	0.027986737	-0.234685114	0.364742	0.040181074
Q3ib Application rate for places on p/g	0.044639837	-0.064258609	0.013541655	0.106787142	-0.011833804	-0.155021949	-0.034686601	0.196811946	0.84952576	0.114053153	-0.103995413	-0.212228645	-0.256816789	0.053254906	0.078265184	0.223922483	-0.065843195
Q4i Financial incentives offered to students to study on o/g courses	0.078335401	0.125107946	0.017750827	0.070348044	-0.002374738	0.073719498	0.080857447	-0.294018529	-0.065714403	0.080498272	0.925761084	0.039048726	-0.0050311	0.009668902	-0.035112905	-0.931557357	0.032048133
Q4i Financial incentives offered to students to study on p/g courses	-0.107983021	0.033787451	0.023246678	0.106293798	0.135327127	0.087794621	0.042920226	0.144405899	0.334387493	-0.032459445	0.750019501	-0.457661647	-0.081545377	0.041744426	0.115927825	0.067585519	-0.050873347
Q5i Change of range of o/g courses	-0.297631751	0.139413456	0.018234615	-0.001843339	0.197933251	0.283309673	0.064439078	-0.071128283	0.108358511	0.255143889	-0.176566068	0.717278734	-0.04656915	0.55073841	0.354664163	-0.029923945	-0.050774529
Q5ii Change of range of p/g courses	0.015665131	0.356662008	-0.166567565	-0.033131712	0.040568779	-0.003949483	0.029100566	-0.065288169	0.919182258	0.053795299	0.082408391	0.184209868	0.107432771	0.208951362	-0.006109012	0.038443226	0.045428629
Q6i Change of range of other courses	0.481164165	0.405366315	-0.240209501	-0.152761778	-0.116830311	0.11739607	-0.122570527	-0.184169627	-0.265775745	0.035781484	-0.146728698	0.177830018	0.386656208	-0.348804064	0.160917508	0.087479984	0.075435781
Q6ii Change of range of electives on o/g courses	-0.045706634	0.322345903	0.364577482	0.042237843	0.104572352	0.116181297	0.2307 66621	0.109841348	0.254028058	0.192762859	-0.020144578	0.491607886	0.180573398	0.183432294	0.034305296	-0.043064937	0.155071108
Q6ii Change of range of electives on p/g courses	-0.034584271	0.406081452	-0.1103857	0.082130634	0.059448018	0.248396804	0.447314788	-0.018857388	0.504973855	0.063822961	0.011284494	0.256281313	0.098145572	0.203218333	-0.271378532	-0.179664153	0.133972121
Q8i Change of research requirements in terms of proportion of staff actively undertaking exemplary funded research	-0.018857462	0.428881349	-0.084340958	-0.058364758	0.101324798	0.071883108	-0.124533858	0.241984746	-0.035503281	0.053630578	0.280104981	0.155785273	-0.000408796	0.217615399	0.036790589	0.015804098	0.037.362788
Q8ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	0.022108173	0.115801029	-0.070121031	-0.036370404	-0.014250787	0.043725108	-0.083310561	0.098711847	-0.081177829	0.039444298	0.055250776	0.048810618	0.215327002	0.390010126	-0.064438481	0.009380118	-0.025974711
Q9iia Change of research requirements in terms of age profile of students registering for research	-0.085267234	-0.367185215	0.384566884	0.103127143	-0.078431346	-0.177772321	0.103707925	0.25442134	-0.403364834	-0.472647394	-0.001972853	0.141921451	-0.084488305	0.219672574	0.082123503	0.148312148	0.139783714
Q9iib Change of research requirements in terms of number of students registering for research	-0.141827757	-0.042111142	0.263878507	-0.072202143	-0.004248348	-0.390084668	0.258868574	-0.347784284	0.245024347	-0.074137482	-0.236151158	-0.213652433	-0.471544525	0.125858474	0.372166039	0.011512062	-0.053664775
Q9iic Change of research requirements in terms of financial incentives offered to students registering for research	-0.063573504	0.186880219	-0.021812954	0.278637815	-0.003266134	0.02420783	0.198730212	-0.088662219	0.068839118	0.099524991	0.069137982	-0.886943525	0.064256158	0.056455852	0.909094434	-0.003529532	-0.011306256
Q9iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	-0.043418588	-0.017796281	0.004600192	-0.143863318	-0.072081511	0.110196584	-0.174782821	-0.05194417	0.0761 6424	0.181781252	0.024419865	0.020965874	0.154873558	0.152286377	-0.135474498	0.077596047	0.054965309
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of o/g courses	0.067966311	0.779180966	-0.170167722	0.125533814	-0.061801974	0.282773818	-0.232406547	0.201852284	0.099261819	0.036499798	0.315230713	0.006829665	0.112647738	-0.037119656	0.012484934	-0.184318131	-0.023605357
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses	0.134391166	0.855628501	-0.045897944	0.235738504	-0.087362113	0.152704377	-0.233229274	0.115275815	0.137729448	0.01071143	0.041056487	-0.09766007	0.094956619	-0.041717748	0.065746791	0.222128927	0.002955268
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding	-0.136671441	0.4136253	0.024311887	0.178364731	-0.008708876	0.158.184777	0.05408567	0.491843985	0.181234332	0.699711289	0.082874287	-0.033152088	0.111181814	0.156421782	0.044823737	-0.001825547	0.242785053
Q7iiiThe amount of formal developmental market research undertaken as to identify sources of external funding	0.231508128	0.438335104	0.105345367	0.470849691	0.1447 4914	-0.162944158	-0.189965584	0.084188212	0.020004483	0.613436267	0.319141183	0.033625818	0.163771362	0.257849962	-0.067729943	-0.133481584	0.084872275
Q8i The amount of internal market research undertaken as to students views of o/g courses	0.258947238	0.180381926	0.053982001	0.623724825	0.180248966	0.123283604	-0.072567086	0.382671104	-0.001477602	0.019819141	0.306122994	0.131984495	0.311343894	-0.223745236	-0.261971431	-0.003569933	-0.117152778
Q8ii The amount of internal market research undertaken as to students views of p/g courses	-0.212351428	0.370822847	0.048411856	0.562396187	-0.029881991	0.049634525	0.062860506	0.018437105	0.396781061	0.103661408	-0.065530298	0.133731274	-0.189868524	-0.257296819	0.002270728	0.039901718	0.034.7.7
Q8iii The amount of internal market research undertaken as to students requirements of the university	-0.350017757	0.800351775	0.013585588	-0.001381502	0.165891134	0.173114841	0.128356815	0.133.23948	0.170447528	0.235211431	0.110719011	0.078473681	-0.149585265	-0.086727875	0.118262626	-0.031898023	0.043818299
Q9i Changes in the investment in marketing activity by the university	0.317874263	0.309787981	-0.261152571	0.122847725	0.432018844	-0.039571973	0.013203381	0.414444342	0.289078329	0.213781449	0.045423244	-0.071982835	0.312777408	-0.061833944	-0.305967162	0.128726951	0.128726951
Q9ii Changes in the investment in marketing activity by an external body on behalf of the university	0.071866102	-0.003188044	-0.296156056	0.640551308	0.753044994	0.168216224	0.118753884	-0.136233476	0.183453098	0.19732883	0.009901088	0.349462876	0.119389471	-0.294154808	0.034261106	-0.034070728	-0.034070728
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision	0.254716472	0.130813213	0.153852063	0.116346161	-0.188330315	0.156845179	0.025024612	0.776211236	0.011865913	0.129483799	0.078556889	0.040696868	0.149149991	0.137121252	-0.40344295	0.049828911	-0.094.21311
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research	0.167395903	0.416736897	0.187473062	0.056575405	0.108074033	0.236113888	0.029464128	0.858417636	-0.023217394	-0.021194777	0.05379152	-0.072711861	0.043994448	0.011896273	0.084706853	0.084706155	0.084.96344
Q11 Impact of market research in the degree of change as indicated in Q1i - Q1i	0.063617343	0.307836015	0.112161706	0.300810893	0.258384456	0.42853482	-0.037851582	0.189628914	0.157768384	-0.171142849	-0.152236248	0.098093684	-0.008388495	0.291378597	0.151342512	-0.279429307	0.011238834	0.273847288
Q13a 90 Influence over the appointment of full time academic staff early 1990s/ 1999	-0.02258127	-0.049901073	0.311254518	0.183087452	0.430626648	-0.284221485	0.274006308	-0.036886613	-0.20135264	0.041852909	0.005379921	0.281442342	0.319153778	0.186239981	-0.296947961	-0.337167777	0.244521242
Q13a 99 Influence over the appointment of full time academic staff in 1999	0.263726565	-0.024588881	0.429115291	0.376737216	0.295154851	-0.387434132	0.271382304	0.348113494	-0.117468153	-0.152236248	0.098093684	-0.008388495	0.291378597	0.151342512	-0.279429307	0.011238834	0.273847288
Q13b 90 Influence over the appointment of part time academic staff early 1990s	0.262063879	0.089738701	-0.282784462	-0.340894533	0.385778666	0.063911539	0.131661967	0.059447877	-0.299434155	0.594074423	0.270043673	0.270536731	0.014872565	-0.254991717	0.197187948	-0.197831369	0.011494837
Q13b 99 Influence over the appointment of part time academic staff in 1999	0.389058456	-0.084351547	0.341161702	0.323814347	-0.018678824	-0.098629643	0.48773.883	0.521736219	-0.094502746	0.326534219	0.03171874	-0.030181735	0.086649387	-0.882483771	0.187427188	0.00304 1367	0.068280437
Q13c 90 Influence over appointing administrative staff early 1990s	0.151374412	-0.395131169	0.350417709	0.33631 1808	0.445061671	-0.168837188	0.388962978	0.029670683	-0.067394196	-0.052634751	0.092252405	0.047261876	0.062195154	0.117482257	-0.072626881	-0.121769484	-0.161359531
Q13c 99 Influence over appointing administrative staff in 1999	0.385987228	-0.257841334	0.218373344	0.486419226	0.206566094	-0.353629688	0.478645431	0.268301271	0.094739425	-0.116787419	0.159964327	0.006068097	-0.033496142	0.088863239	0.094023615	0.174618583	-0.098171797
Q13d 90 Influence over appointing support services (external to the university) early 1990s	0.281195808	-0.396338195	-0.108842098	0.188111746	0.56457675	-0.368516663	-0.103731198	-0.116406132	-0.044484636	0.616484163	-0.302654033	0.162736656	-0.123270334	0.911611462	0.089552667	0.025476214	-0.234211647
Q13d 99 Influence over appointing support services (external to the university) in 1999	0.345851165	-0.499179046	-0.054729744	0.512277962	0.323218604	-0.085234472	0.156996666	0.041196753	-0.014482845	0.07624111	-0.284378739	0.084312586	-0.118548868	0.784981898	0.244961274	0.207295203	-0.018790751
Q13e 90 Influence over the amount of remission on teaching is academic staff for research / administration early 1990s	-0.123897094	0.098354611	0.206037241	0.129796853	0.008528585	-0.191525888	0.058.17787	-0.130801764	-0.13588184	-0.221761836	-0.029514595	0.052205779	-0.147111514	-0.87145218	0.08137823	0.090842118	-0.034651478
Q13e 99 Influence over the amount of remission on teaching is academic staff for research / administration in 1999	0.194374931	-0.166296456	0.042505258	-0.109330536	-0.141806181	-0.252378012	0.318203884	0.409112256	-0.188308143	-0.331623256	-0.062511836	0.015088878	0.152055523	-0.096234.2001	-0.047964898	0.117478546	0.024771797
Q14i 90 Approval to invest in IT for academic activities early 1990s	0.026834254	-0.216157224	0.212005438	0.07.5834804	0.204894248	0.824862944	-0.006628226	0.096307473	-0.07452667	0.08.1.1684	-0.158495139	-0.000140148	-0.079250774	0.098219494	0.194.49884	-0.064619933	0.121462958
Q14i 99 Approval to invest in IT for academic activities in 1999	0.543351107	-0.206581748	0.487536125	0.010835062	-0.043288131	0.108480679	0.23458479	0.407212898	-0.238886027	0.096783719	-0.038142957	-0.077297055	0.089606026	0.10276825	0.073640991	0.13.60 1389	0.155239852
Q14ii 90 Approval to invest in IT for administration early 1990s	-0.235317438	-0.025053632	0.009635228	-0.011378245	0.534817322	0.061822119	0.198114397	0.112376183	0.2.2188	-0.401371812	-0.474986408	0.071381804	0.064781655	0.437844991	0.116726342	-0.249515005	-0.077.15482
Q14ii 99 Approval to invest in IT for administration in 1999	0.253596831	-0.123248838	0.234665879	0.214813015	0.188713918	0.039602189	0.367482303	0.402313869	0.237464996	-0.432762781	-0.443763914	0.071835182	0.075816272	0.462864262	0.034631672	0.106495267	-0.010495012
Q15i 90 Authority for o/g course development and implementation early 1990s	-0.02427219	-0.165198644	0.134038118	-0.862341131	0.063602839	0.155990408	0.201173088	0.046602476	-0.181735468	-0.270984229	-0.061601886	0.210788412	-0.081163498	0.167110097	0.136340475	-0.043966459	-0.040847.38
Q15i 99 Authority for o/g course development and implementation in 1999	0.049851068	-0.213879136	0.119057131	-0.063442702	0.105801115	-0.072685425	0.885838508	0.144872196	-0.124338361	-0.132703125	0.008808467	-0.012498698	-0.230455838	0.396440294	0.090378508	0.049911256	-0.091237875
Q15ii 90 Authority for p/g course development and implementation early 1990s	-0.067185808	-0.075815073	0.186504496	-0.823427182	0.087025982	0.113001	0.135350768	-0.073467786	0.008139621	0.088812621	-0.076221278	0.114995727	0.057368182	-0.391191851	0.081373112	-0.116403543	0.044348961
Q15ii 99 Authority for p/g course development and implementation in 1999	0.004392122	-0.059185279	-0.018396279	-0.212794118	0.174437821	-0.143185674	0.907795558	-0.036318715	0.132134352	-0.209162985	0.01835723	-0.183532921	-0.003260781	-0.074440256	-0.031815295	-0.065715618	0.032062571
Q15iii 90 Authority for other course development and implementation early 1990s	0.068160881	0.183857864	0.182706487	-0.818515178	-0.015541035	-0.040196882	0.009535936	0.016771081	0.12667.2873	0.053148627	0.146307.28	-0.016902854	0.080256773	-0.388673848	0.003887404	0.050861512	0.039783.48
Q15iii 99 Authority for other course development and implementation in 1999	0.093409173	0.329367238	-0.131831844	-0.125316157	0.232308948	-0.262514783	0.432422833	0.043178847	0.393489444	-0.3529.3847	-0.037116804	-0.285862458	-0.081882191	-0.419677714	0.137.66934	0.165207033	-0.011.63758
Q16i 90 Approval of travel expenditure (UK) early 1990s	0.219280412	-0.039336711	0.0473.4808	-0.248404278	0.026571678	0.021711328	0.084785864	0.053067158	-0.046599418	0.044813035	0.012240733	0.022808718	-0.283500997	0.003167475	-0.031736851	0.043841166	
Q16i 99 Approval of travel expenditure (UK) in 1999	0.956738074	-0.04352478	0.213117688	0.026578108	0.074527235	-0.021840885	0.048772872	0.087.58855	0.034523845	-0.05324336	-0.010381234	-0.025114911	-0.040875372	0.031262873	0.043401868	0.021445227	-0.021301273
Q16ii 90 Approval of travel expenditure (Europe) early 1990s	0.214458229	-0.043427748	0.063268858	-0.058208497	0.028709858	0.018423115	-0.082945361	0.030758553	-0.015577184	0.042737403	0.005416732	0.011119983	-0.048366973	0.009677196	-0.013301457	0.044.70586	
Q16ii 99 Approval of travel expenditure (Europe) in 1999	0.957385611	-0.045263043	0.217.20126	0.024386881	0.075018429	-0.026167868	0.035853753	0.086904686	0.034627127	-0.023863412	-0.011778686	-0.035318119	-0.052150143	0.029755634	0.043.60749	0.01943613	0.021.43.48
Q16iii 90Approval of overtime expenditure early 1990s	0.025036861	0.003852696	0.198.6708	-0.187128442	0.136585046	0.124135357	-0.036690828	-0.040653281	-0.003402247	0.033437361	0.020569139	0.115.86757	-0.0546866	-0.008644216	0.024.61333	-0.019621853	-0.003314317
Q16iii 99Approval of overtime expenditure in 1999	0.283489058	0.077032978	-0.155211748	-0.024815932	0.343264055	-0.402143784	0.28462021	0.135773042	0.145481154	-0.231585491	-0.141661132	-0.026560297	-0.142736997	0.027995631	0.042.13948	-0.201636778	-0.473.29234
Q16iv 90 Approval of capital expenditures early 1990s	-0.008716851	0.070874754	0.193531825	-0.232152748	0.035877084	0.115512447	0.104060206	-0.037815584	-0.315347836	0.147113078	-0.047611324	0.181.60238	-0.082936926	0.384.95807	0.139.19348	0.042.3.7	0.447.07541
Q16iv 99 Approval of capital expenditures in 1999	0.650548518	0.022.49529	0.183333281	-0.32178832	0.234528486	-0.136.0788	-0.113302263	0.158435746	-0.228738473	0.194351196	0.018780674	0.275109319	-0.160.12398	-0.43.03138	0.249.49848	-0.151.74118	0.316.06417
Q16v 90 Approval of conferences early 1990s	0.419457548	0.071034884	0.243345986	-0.151120411	-0.056586484	-0.261354854	-0.045152199	0.078455508	-0.014012718	0.157483097	-0.070903359	-0.023.63969	0.035083588	-0.033190903	0.163218412	-0.006914478	0.034.87344
Q16v 99 Approval of conferences in 1999	0.941903858	0.018944062	0.16286351	0.106504781	0.033890138	0.062.80844	0.082380874	0.026.87341	-0.007402336	-0.054780678	-0.056629868	0.001118152	-0.033.90106	-0.003.90064	0.063.80064	-0.063190064	0.063.80064
Q16vi 90 Approval of appointment of staff early 1990s	-0.068550645	0.583443788	0.248.59837	-0.236777285	0.570360335	-0.060.44864	0.083425491	0.183783691	-0.164.38502	-0.123634312	0.078781386	0.121.80962	0.167.69007	0.060.01004	0.190.4736	0.171.06234	0.060.06364
Q16vi 99 Approval of appointment of staff in 1999	0.397.42632	0.438.61525	-0.168.20617	-0.027.06632	0.673227781	-0.079.26561	0.047.64467	0.246.03576	-0.216.58252	-0.287.63958	0.060.53191	-0.041.88884	0.019.02953	-0.013.66562	-0.231.78048	0.118.7336	0.307.16483

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a

Rotation converged in 60 iterations.

Appendix 31: Graphical summary of the Broader Contingent Factor Analysis ('new and 'old' universities)



Importance represented by a value of 0.5 or higher from the rotated component matrix

Appendix 32: Factor Analysis of the Broader Contingent Factor Analysis (business departments)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.0840	22.9772	22.9772	10.7896	15.4138	15.4138
2	7.8772	11.2532	34.2304	5.2195	7.4565	22.8702
3	5.1321	7.3316	41.5620	4.9754	7.1077	29.9779
4	4.7524	6.7892	48.3511	4.1252	5.8932	35.8711
5	4.3512	6.2160	54.5671	3.8529	5.5042	41.3753
6	3.6483	5.2119	59.7790	3.8166	5.4523	46.8275
7	3.3950	4.8501	64.6290	3.8126	5.4465	52.2740
8	2.8332	4.0474	68.6764	3.7736	5.3909	57.6649
9	2.5151	3.5930	72.2694	3.2181	4.5973	62.2622
10	2.4118	3.4455	75.7149	3.0985	4.4265	66.6887
11	2.0839	2.9771	78.6920	3.0206	4.3152	71.0039
12	1.9206	2.7437	81.4357	2.8325	4.0464	75.0502
13	1.5773	2.2533	83.6890	2.7200	3.8857	78.9359
14	1.3984	1.9978	85.6868	2.2034	3.1478	82.0837
15	1.2966	1.8523	87.5391	2.1233	3.0333	85.1170
16	1.1692	1.6703	89.2094	2.0041	2.8629	87.9799
17	1.0653	1.5218	90.7312	1.9259	2.7513	90.7312
18	0.9839	1.4056	92.1367			
19	0.8841	1.2630	93.3998			
20	0.8115	1.1593	94.5591			
21	0.6976	0.9966	95.5556			
22	0.6874	0.9820	96.5376			
23	0.5659	0.8084	97.3461			
24	0.3870	0.5528	97.8989			
25	0.3354	0.4791	98.3781			
26	0.3048	0.4354	98.8135			
27	0.2933	0.4190	99.2325			
28	0.2229	0.3185	99.5509			
29	0.2021	0.2887	99.8397			
30	0.1122	0.1603	100.0000			
31	0.0000	0.0000	100.0000			
32	0.0000	0.0000	100.0000			
33	0.0000	0.0000	100.0000			
34	0.0000	0.0000	100.0000			
35	0.0000	0.0000	100.0000			
36	0.0000	0.0000	100.0000			
37	0.0000	0.0000	100.0000			
38	0.0000	0.0000	100.0000			
39	0.0000	0.0000	100.0000			
40	0.0000	0.0000	100.0000			
41	0.0000	0.0000	100.0000			
42	0.0000	0.0000	100.0000			
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61	0.0000	0.0000	100.0000			
62	0.0000	0.0000	100.0000			
63	0.0000	0.0000	100.0000			
64	0.0000	0.0000	100.0000			
65	0.0000	0.0000	100.0000			
66	0.0000	0.0000	100.0000			
67	0.0000	0.0000	100.0000			
68	0.0000	0.0000	100.0000			
69	0.0000	0.0000	100.0000			
70	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

	Component																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Q1i Change of delivery of u/g course	-0.410	-0.282	-0.074	0.027	-0.037	-0.024	-0.264	0.033	0.013	-0.160	0.099	0.059	-0.021	0.015	0.066	0.029	0.752
Q1ii Change of delivery of p/g course	-0.006	-0.187	-0.147	0.420	-0.032	0.025	-0.325	0.254	-0.040	0.206	-0.289	0.229	0.123	0.127	-0.287	-0.294	0.369
Q2i Use of IT to deliver u/g courses	0.137	0.527	-0.003	-0.156	0.289	-0.047	-0.274	-0.082	0.126	0.026	0.309	0.024	0.209	0.015	-0.098	-0.197	0.473
Q2ii Use of IT to deliver p/g courses	0.170	0.414	-0.210	-0.089	-0.293	0.051	-0.177	0.127	-0.118	0.218	0.057	0.049	0.195	-0.018	-0.653	0.018	-0.060
Q3i Entry details in terms of 'A' Level points for u/g	-0.097	-0.071	0.008	0.090	0.157	0.040	0.111	0.005	-0.078	0.088	0.041	-0.037	0.894	-0.045	-0.004	0.004	0.021
Q3iib Age profile of u/g	-0.046	-0.161	0.197	-0.042	-0.083	-0.223	0.008	-0.003	0.023	-0.033	0.888	-0.028	0.000	-0.057	0.048	-0.085	0.028
Q3iib Age profile of p/g	-0.042	0.346	-0.063	-0.196	-0.098	0.158	0.340	-0.162	-0.014	0.235	0.580	0.195	0.014	0.128	0.026	0.228	-0.291
Q3iiia Geographic catchment area of u/g	0.248	-0.050	0.023	0.201	0.064	0.360	0.216	0.040	-0.074	0.171	-0.152	-0.297	0.130	-0.147	0.678	0.019	0.026
Q3iiib Geographic catchment area of p/g	0.458	0.430	0.036	0.079	0.081	0.196	0.041	0.008	-0.095	-0.197	0.171	-0.098	-0.131	0.234	0.437	-0.318	-0.213
Q3iva Application rate for places on u/g	0.158	-0.027	-0.333	0.619	0.159	-0.064	0.130	0.149	-0.013	-0.005	0.185	-0.208	0.219	0.073	0.037	0.348	0.239
Q3ivb Application rate for places on p/g	0.369	0.105	-0.086	0.409	-0.060	0.386	-0.025	0.153	-0.335	0.059	0.156	-0.123	0.453	-0.102	0.054	-0.040	-0.111
Q4i Financial incentives offered to students to study on u/g courses	0.063	0.127	-0.030	0.200	-0.150	0.098	-0.087	0.021	0.104	0.897	-0.066	0.031	-0.014	-0.025	0.019	0.044	-0.074
Q4ii Financial incentives offered to students to study on p/g courses	-0.078	-0.057	-0.153	0.116	0.057	0.045	0.020	0.010	-0.240	0.875	0.079	-0.052	0.054	-0.009	-0.010	-0.038	-0.008
Q5i Change of range of u/g courses	0.074	0.108	0.009	0.116	-0.095	-0.046	-0.009	0.048	0.914	-0.083	-0.051	0.095	-0.060	0.057	-0.025	0.065	0.024
Q5ii Change of range of p/g courses	0.219	0.105	-0.085	0.701	0.002	0.282	-0.196	0.194	0.109	0.176	0.049	0.147	0.331	-0.002	-0.098	-0.039	-0.037
Q5iii Change of range of other courses	0.049	0.017	0.069	-0.010	-0.381	0.064	0.112	-0.024	0.190	-0.040	-0.031	0.775	-0.071	-0.090	-0.102	0.120	0.218
Q5iv Change of range of electives on u/g courses	0.049	0.074	0.320	0.772	0.117	-0.094	0.143	0.105	0.284	0.134	-0.087	0.021	-0.162	-0.042	0.065	0.140	-0.023
Q5v Change of range of electives on p/g courses	0.155	0.149	0.095	0.861	0.198	0.115	-0.040	0.100	-0.030	0.176	-0.107	-0.083	0.015	-0.007	0.092	-0.098	-0.018
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.108	0.070	0.074	0.194	0.794	-0.122	0.054	0.333	0.033	0.029	-0.072	-0.068	0.217	-0.031	0.134	0.097	-0.016
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	-0.003	-0.010	0.188	0.121	0.886	0.053	-0.023	0.182	-0.045	-0.123	-0.055	-0.179	0.085	-0.019	-0.037	-0.041	0.040
Q6iiia Change of research requirements in terms of age profile of students registering for research	-0.167	-0.209	0.029	0.002	0.015	-0.287	-0.009	-0.071	0.088	0.021	-0.841	-0.034	-0.411	-0.272	0.068	0.084	-0.259
Q6iiib Change of research requirements in terms of number of students registering for research	-0.072	-0.019	0.358	-0.151	-0.047	-0.006	0.294	0.047	0.074	0.144	-0.812	0.126	0.171	0.150	0.402	-0.190	-0.071
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research	-0.039	0.087	0.098	0.094	-0.003	0.008	0.090	0.020	-0.560	0.546	-0.169	-0.082	0.170	0.343	0.002	-0.027	0.095
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	-0.065	0.010	0.082	0.089	0.284	-0.090	-0.074	0.700	-0.105	-0.210	-0.154	-0.117	0.264	0.168	-0.080	0.295	-0.133
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses	0.055	0.080	-0.003	0.208	0.266	0.335	-0.055	0.427	0.148	0.259	0.114	0.237	-0.338	0.223	-0.080	-0.342	0.238
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses	0.070	0.142	-0.318	0.145	0.376	0.080	-0.189	0.349	-0.168	0.122	-0.084	0.168	-0.031	0.434	-0.008	-0.063	0.449
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding	-0.127	0.035	0.010	0.155	0.355	0.175	0.037	0.802	0.113	0.053	0.083	0.063	-0.070	0.040	-0.017	-0.105	0.113
Q7ivThe amount of formal developmental market research undertaken as to identify sources of external funding	0.147	0.073	-0.326	0.285	0.015	0.137	0.211	0.754	0.164	0.133	-0.102	0.001	0.030	0.020	-0.063	-0.042	0.049
Q8i The amount of internal market research undertaken as to students views of u/g courses	0.126	-0.230	-0.197	0.088	0.330	0.012	-0.137	0.158	0.437	-0.090	-0.083	-0.101	-0.034	0.240	-0.518	-0.028	0.020
Q8ii The amount of internal market research undertaken as to students views of p/g courses	0.061	-0.084	-0.183	0.199	0.142	0.229	-0.425	0.217	0.150	-0.001	-0.266	-0.166	0.219	0.548	-0.313	0.066	-0.082
Q8iii The amount of internal market research undertaken as to students requirements of the university	0.005	-0.048	-0.031	0.278	0.189	-0.164	-0.413	0.135	0.525	0.011	-0.029	0.156	-0.010	0.539	0.020	-0.170	0.015
Q9i Changes in the investment in marketing activity by the university	0.146	0.149	-0.086	-0.091	-0.154	0.057	-0.117	0.429	0.110	0.341	0.380	-0.048	-0.453	0.357	0.110	0.042	-0.085
Q9ii Changes in the investment in marketing activity by an external body on behalf of the university	-0.328	0.171	-0.047	-0.266	-0.119	0.038	0.137	0.120	0.051	0.003	0.185	0.060	-0.240	0.877	-0.076	0.148	0.072
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision	0.418	-0.005	-0.388	-0.003	0.245	-0.220	-0.219	0.432	-0.144	-0.186	0.217	-0.241	-0.145	-0.068	-0.037	-0.225	0.022
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research	0.316	0.066	-0.153	-0.045	0.450	0.044	-0.418	0.436	-0.062	-0.298	-0.027	-0.084	-0.174	0.120	0.022	-0.034	0.041
Q11 Impact of market research in the degree of change as indicated in Q1 - Q5	0.136	-0.180	-0.159	0.298	0.425	0.092	0.122	0.187	0.438	-0.368	0.098	-0.186	-0.116	-0.002	0.098	-0.359	0.040
Q13ia.90 Influence over the appointment of full time academic staff early 1990s/ 1999	0.264	0.367	0.247	0.205	-0.075	0.271	0.177	0.100	0.327	-0.032	0.005	-0.129	-0.184	0.139	-0.150	0.523	-0.187
Q13ia.99 Influence over the appointment of full time academic staff in 1999	0.797	0.150	-0.062	0.186	0.144	0.158	0.017	-0.007	0.091	-0.108	-0.056	0.007	0.002	-0.034	-0.134	0.255	-0.220
Q13ib.90 Influence over the appointment of part time academic staff early 1990s	0.507	0.157	0.271	-0.011	0.126	-0.112	0.070	0.448	0.489	0.012	-0.049	0.018	0.073	0.120	-0.073	0.201	-0.020
Q13ib.99 Influence over the appointment of part time academic staff in 1999	0.822	-0.069	0.086	0.138	0.107	-0.035	0.089	0.208	0.173	-0.104	-0.240	0.022	0.091	-0.187	0.002	0.110	-0.154
Q13ii.90 Influence over appointing administrative staff early 1990s	0.548	0.107	0.251	0.100	0.084	0.300	0.490	-0.047	0.179	-0.088	-0.081	-0.214	-0.096	0.077	0.009	0.333	-0.035
Q13ii.99 Influence over appointing administrative staff in 1999	0.760	0.042	-0.054	0.095	0.083	0.098	0.486	-0.033	0.121	0.056	-0.004	0.133	0.013	-0.108	-0.024	-0.035	-0.106
Q13iii.90 Influence over appointing support services (external to the university) early 1990s	0.248	0.160	0.210	-0.057	-0.022	0.118	0.859	0.178	-0.083	-0.057	-0.045	-0.010	0.050	0.031	0.065	0.041	-0.081
Q13iii.99 Influence over appointing support services (external to the university) in 1999	0.359	0.042	-0.120	0.045	-0.004	0.011	0.820	-0.027	-0.027	-0.036	0.033	0.080	0.103	-0.076	0.191	-0.052	-0.171
Q13iv.90 Influence over the amount of remission on teaching to academic staff for research / administration early 1990s	0.237	0.284	0.103	-0.059	0.005	0.736	0.108	-0.016	0.003	0.095	-0.095	0.145	0.106	0.128	0.071	-0.013	0.077
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration in 1999	0.686	-0.025	0.022	-0.191	-0.033	0.249	0.046	-0.175	-0.125	-0.119	0.276	0.110	-0.253	0.081	0.055	0.026	0.132
Q14i.90 Approval to invest in IT for academic activities early 1990s	0.310	0.698	0.262	0.051	0.268	0.205	0.096	0.097	-0.027	0.102	-0.108	-0.316	-0.082	0.156	0.024	-0.064	-0.014
Q14i.99 Approval to invest in IT for academic activities in 1999	0.820	0.335	0.232	0.052	0.093	0.008	-0.003	0.047	-0.036	-0.022	-0.055	-0.085	-0.031	0.097	-0.079	-0.083	0.091
Q14ii.90 Approval to invest in IT for administration early 1990s	0.194	0.824	0.145	-0.062	-0.039	0.187	0.143	0.115	0.010	-0.133	-0.018	-0.077	-0.068	0.015	-0.133	0.130	0.019
Q14ii.99 Approval to invest in IT for administration in 1999	0.599	0.452	-0.223	0.121	-0.123	0.115	0.218	-0.093	0.058	-0.212	0.018	0.038	-0.352	0.020	0.001	0.107	0.022
Q15i.90 Authority for u/g course development and implementation early 1990s	0.111	0.324	0.818	0.085	0.024	0.167	-0.021	0.067	-0.134	0.017	0.109	0.012	-0.208	-0.128	0.148	0.071	-0.092
Q15i.99 Authority for u/g course development and implementation in 1999	0.278	-0.033	0.838	-0.114	0.121	-0.009	0.154	-0.208	0.112	-0.114	-0.102	0.041	0.092	-0.084	0.075	-0.085	0.029
Q15ii.90 Authority for p/g course development and implementation early 1990s	0.095	0.285	0.855	0.160	0.001	0.133	-0.076	0.083	-0.108	0.024	0.178	0.100	-0.111	-0.051	0.060	0.082	-0.086
Q15ii.99 Authority for p/g course development and implementation in 1999	0.233	-0.073	0.875	0.023	0.077	0.024	0.084	-0.115	0.096	-0.132	-0.047	0.177	0.188	0.060	-0.017	0.022	0.041
Q15iii.90 Authority for other course development and implementation early 1990s	0.377	0.132	0.194	0.081	-0.041	0.179	-0.337	0.354	-0.097	0.039	0.156	0.500	-0.154	-0.035	0.270	-0.009	-0.163
Q15iii.99 Authority for other course development and implementation in 1999	0.339	-0.122	0.408	-0.064	0.024	0.085	0.007	-0.040	0.011	-0.033	-0.056	0.739	0.052	0.196	-0.101	-0.170	-0.091
Q16i.90 Approval of travel expenditure (UK) early 1990s	0.563	0.315	0.135	0.254	0.091	0.626	0.007	0.139	-0.079	0.046	-0.035	-0.066	0.030	-0.037	0.068	0.066	-0.059
Q16i.99 Approval of travel expenditure (UK) in 1999	0.876	0.050	0.209	0.078	0.050	0.226	0.130	0.081	-0.054	0.005	0.075	0.010	0.094	-0.082	0.028	-0.139	0.079
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s	0.457	0.362	0.170	0.259	0.096	0.676	0.059	0.170	-0.114	0.059	-0.066	-0.039	0.049	-0.078	0.054	0.017	-0.099
Q16ii.99 Approval of travel expenditure (o'seas) in 1999	0.834	0.081	0.188	0.199	0.019	0.220	0.213	0.038	-0.081	0.060	0.126	0.076	0.026	-0.075	0.040	-0.166	-0.020
Q16iii.90Approval of overtime expenditure early 1990s	0.076	0.394	0.308	-0.343	-0.037	0.355	0.132	-0.026	0.393	0.117	0.073	0.420	-0.019	0.030	-0.124	-0.090	0.022
Q16iii.99 Approval of overtime expenditure in 1999	0.512	-0.041	0.252	-0.353	-0.184	0.291	0.254	-0.061	0.341	0.057	-0.097	0.305	-0.134	0.084	0.088	-0.063	-0.032
Q16iv.90 Approval of capital expenditures early 1990s	0.350	0.775	0.123	0.190	0.030	0.124	-0.078	0.096	-0.031	0.030	0.010	0.099	0.179	-0.063	0.128	0.065	-0.140
Q16iv.99 Approval of capital expenditures in 1999	0.775	0.376	0.084	0.154	-0.084	-0.183	-0.136	-0.026	0.084	0.114	0.053	-0.009	0.072	-0.017	0.118	0.134	-0.137
Q16v.90 Approval of conferences early 1990s	0.429	0.253	0.091	0.033	-0.369	0.621	0.033	0.209	-0.038	0.044	0.071	0.211	-0.117	-0.003	0.089	0.161	-0.082
Q16v.99 Approval of conferences in 1999	0.787	-0.018	0.167	-0.146	-0.293	0.255	0.050	0.115	0.147	0.044	0.030	0.150	-0.055	0.033	0.008	-0.051	0.031
Q16vi.90 Approval of appointment of staff early 1990s	0.401	0.416	0.159	0.221	0.390	0.217	-0.042	0.036	0.069	0.174	0.162	0.215	-0.086	0.156	0.031	0.424	0.118
Q16vi.99 Approval of appointment of staff in 1999	0.694	0.268	-0.106	-0.019	0.378	-0.039	-0.159	-0.092	0.081	0.109	-0.070	0.144	-0.016	0.211	0.039	0.319	-0.048

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

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Rotation converged in 72 iterations.

Appendix 33: Factor Analysis of the Broader Contingent Factor Analysis (non-business departments)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.1060	21.5800	21.5800	8.4048	12.0069	12.0069
2	8.9218	12.7454	34.3254	7.4661	10.6658	22.6727
3	6.7286	9.6122	43.9376	7.0787	10.1125	32.7852
4	5.8376	8.3394	52.2770	6.1802	8.8288	41.6140
5	5.2914	7.5591	59.8361	5.3206	7.6008	49.2148
6	3.6170	5.1672	65.0033	4.1223	5.8889	55.1037
7	3.4557	4.9367	69.9401	3.8260	5.4657	60.5694
8	3.2185	4.5978	74.5379	3.2194	4.5992	65.1686
9	2.6146	3.7351	78.2730	3.1552	4.5074	69.6760
10	2.4413	3.4875	81.7605	3.0428	4.3469	74.0229
11	2.2082	3.1545	84.9151	2.8779	4.1113	78.1342
12	1.9334	2.7619	87.6770	2.6779	3.8256	81.9598
13	1.7597	2.5138	90.1908	2.6778	3.8255	85.7853
14	1.4488	2.0697	92.2605	2.6032	3.7189	89.5042
15	1.4327	2.0467	94.3072	2.3295	3.3279	92.8320
16	1.0905	1.5579	95.8651	2.1232	3.0331	95.8651
17	0.8753	1.2505	97.1156			
18	0.8520	1.2171	98.3327			
19	0.6373	0.9104	99.2431			
20	0.5298	0.7569	100.0000			
21	0.0000	0.0000	100.0000			
22	0.0000	0.0000	100.0000			
23	0.0000	0.0000	100.0000			
24	0.0000	0.0000	100.0000			
25	0.0000	0.0000	100.0000			
26	0.0000	0.0000	100.0000			
27	0.0000	0.0000	100.0000			
28	0.0000	0.0000	100.0000			
29	0.0000	0.0000	100.0000			
30	0.0000	0.0000	100.0000			
31	0.0000	0.0000	100.0000			
32	0.0000	0.0000	100.0000			
33	0.0000	0.0000	100.0000			
34	0.0000	0.0000	100.0000			
35	0.0000	0.0000	100.0000			
36	0.0000	0.0000	100.0000			
37	0.0000	0.0000	100.0000			
38	0.0000	0.0000	100.0000			
39	0.0000	0.0000	100.0000			
40	0.0000	0.0000	100.0000			
41	0.0000	0.0000	100.0000			
42	0.0000	0.0000	100.0000			
43	0.0000	0.0000	100.0000			
44	0.0000	0.0000	100.0000			
45	0.0000	0.0000	100.0000			
46	0.0000	0.0000	100.0000			
47	0.0000	0.0000	100.0000			
48	0.0000	0.0000	100.0000			
49	0.0000	0.0000	100.0000			
50	0.0000	0.0000	100.0000			
51	0.0000	0.0000	100.0000			
52	0.0000	0.0000	100.0000			
53	0.0000	0.0000	100.0000			
54	0.0000	0.0000	100.0000			
55	0.0000	0.0000	100.0000			
56	0.0000	0.0000	100.0000			
57	0.0000	0.0000	100.0000			
58	0.0000	0.0000	100.0000			
59	0.0000	0.0000	100.0000			
60	0.0000	0.0000	100.0000			
61	0.0000	0.0000	100.0000			
62	0.0000	0.0000	100.0000			
63	0.0000	0.0000	100.0000			
64	0.0000	0.0000	100.0000			
65	0.0000	0.0000	100.0000			
66	0.0000	0.0000	100.0000			
67	0.0000	0.0000	100.0000			
68	0.0000	0.0000	100.0000			
69	0.0000	0.0000	100.0000			
70	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

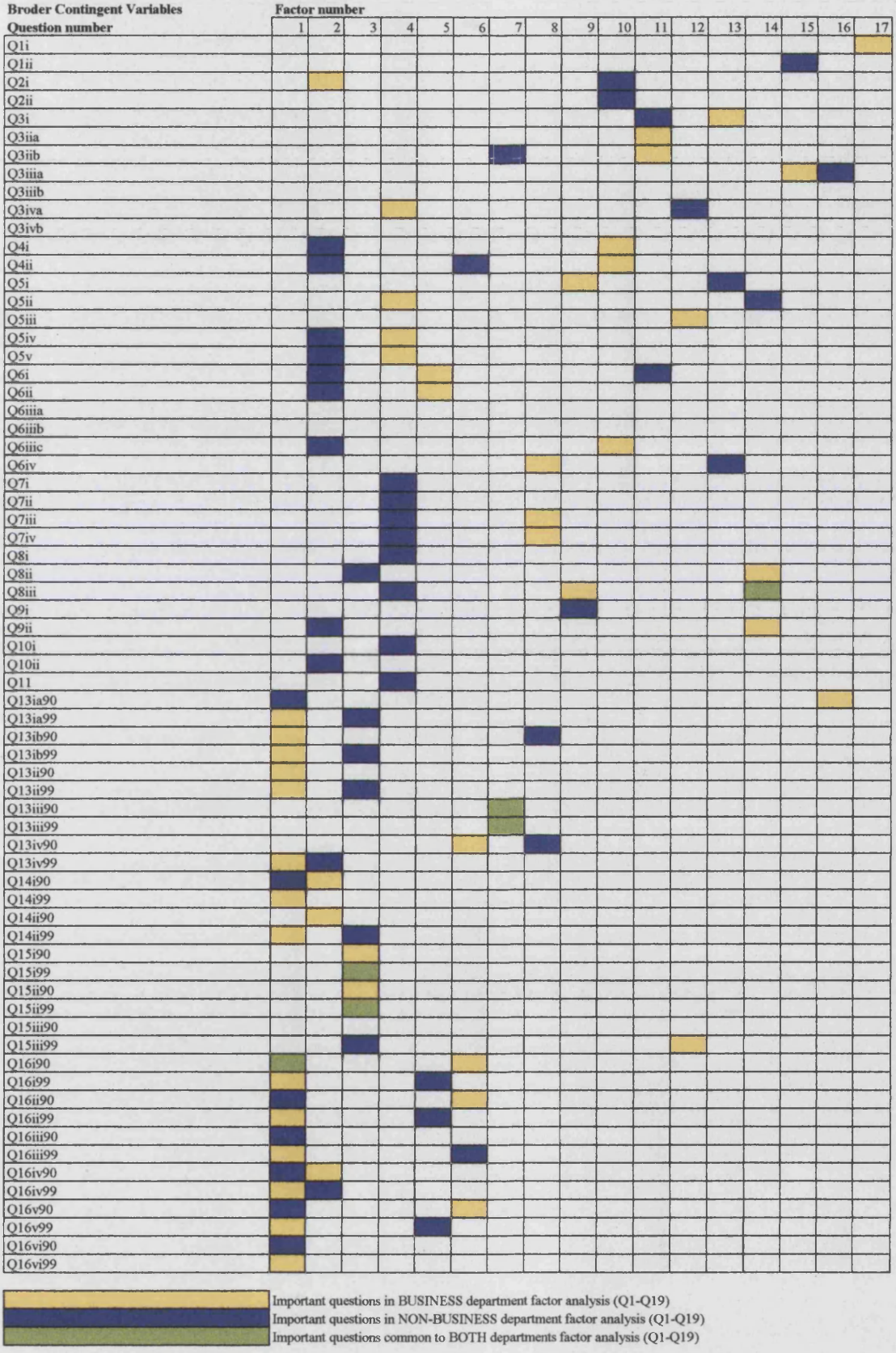
Rotated Component Matrix

	Component															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Q1i Change of delivery of u/g course	-0.172	-0.424	0.238	0.229	-0.191	-0.018	-0.122	0.137	-0.520	0.282	-0.325	0.244	0.064	0.115	0.079	-0.173
Q1ii Change of delivery of p/g course	-0.072	-0.093	0.103	0.262	-0.333	0.023	0.078	-0.085	-0.048	0.071	-0.070	0.008	-0.109	0.053	0.858	0.010
Q2i Use of IT to deliver u/g courses	-0.026	-0.091	-0.075	-0.090	0.172	-0.032	0.032	0.069	-0.107	0.922	-0.054	0.238	0.079	0.080	-0.016	-0.054
Q2ii Use of IT to deliver p/g courses	0.093	-0.265	0.144	0.082	-0.224	-0.314	-0.042	0.112	0.337	0.700	0.098	-0.068	0.006	-0.009	0.174	0.266
Q3i Entry details in terms of 'A' Level points for u/g	0.094	0.020	-0.130	0.029	0.153	-0.081	0.059	0.191	-0.108	-0.077	0.865	0.243	-0.016	-0.043	0.019	-0.068
Q3iib Age profile of u/g	0.107	0.432	0.058	-0.013	-0.568	-0.117	0.342	-0.236	-0.018	-0.036	-0.030	0.401	-0.099	-0.002	-0.048	-0.152
Q3iib Age profile of p/g	-0.052	-0.064	0.267	0.067	-0.083	0.072	0.837	-0.061	-0.083	-0.034	0.080	0.027	-0.064	0.065	0.143	0.361
Q3iiia Geographic catchment area of u/g	-0.153	0.076	-0.252	0.137	-0.080	-0.042	0.078	-0.058	0.079	0.050	-0.048	0.050	-0.053	0.036	0.050	0.856
Q3iiib Geographic catchment area of p/g	-0.496	-0.256	0.032	-0.030	-0.160	0.188	0.308	0.153	-0.266	-0.043	-0.078	0.090	-0.342	-0.134	-0.199	0.468
Q3iva Application rate for places on u/g	-0.001	-0.181	0.009	0.097	0.052	-0.197	-0.001	-0.113	0.016	0.214	0.259	0.843	0.184	0.021	0.019	0.117
Q3ivb Application rate for places on p/g	-0.179	-0.448	-0.080	0.211	-0.185	-0.072	0.376	-0.158	0.436	0.326	0.080	-0.338	0.209	0.126	0.009	0.079
Q4i Financial incentives offered to students to study on u/g courses	-0.002	0.852	-0.075	-0.039	0.010	0.018	0.369	-0.113	-0.170	-0.373	0.079	0.115	-0.008	-0.127	0.320	0.022
Q4ii Financial incentives offered to students to study on p/g courses	-0.136	0.806	-0.034	0.144	0.183	0.503	0.047	-0.132	-0.467	-0.064	-0.128	-0.018	-0.008	-0.187	-0.079	0.069
Q5i Change of range of u/g courses	-0.150	-0.018	-0.013	0.353	0.213	0.180	-0.067	-0.057	-0.086	0.020	0.030	-0.038	0.834	0.046	-0.096	0.003
Q5ii Change of range of p/g courses	-0.239	0.311	0.198	0.110	-0.112	0.280	0.223	0.056	0.146	0.257	0.031	-0.113	0.130	0.818	0.037	0.023
Q5iii Change of range of other courses	0.131	0.164	-0.289	0.369	0.186	-0.383	0.245	-0.057	0.070	0.194	0.427	0.133	-0.240	0.318	0.069	0.100
Q5iv Change of range of electives on u/g courses	-0.117	0.782	0.166	0.305	0.091	0.174	0.113	0.021	0.157	-0.007	-0.155	-0.042	0.154	0.198	-0.153	-0.028
Q5v Change of range of electives on p/g courses	-0.250	0.572	0.149	0.424	0.128	0.045	0.159	0.200	0.163	0.111	-0.040	0.022	-0.098	0.078	0.284	-0.287
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.019	0.536	0.153	0.140	0.037	0.206	0.177	-0.201	0.039	0.111	0.668	-0.081	0.030	0.202	-0.121	-0.020
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	-0.182	0.856	0.142	-0.174	0.125	-0.089	-0.069	-0.057	0.030	0.032	0.140	-0.058	0.126	0.065	-0.129	0.112
Q6iiia Change of research requirements in terms of age profile of students registering for research	-0.489	0.273	0.377	0.344	0.023	-0.178	-0.112	0.225	-0.234	-0.073	-0.027	-0.234	0.170	0.026	-0.053	0.329
Q6iiib Change of research requirements in terms of number of students registering for research	-0.232	0.269	0.095	-0.122	-0.293	0.497	0.208	-0.156	0.191	-0.217	-0.157	-0.348	0.131	0.183	-0.333	0.000
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research	0.218	0.686	0.083	0.207	0.027	0.452	0.075	-0.114	-0.013	-0.134	0.292	-0.185	-0.085	-0.100	0.160	0.093
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	0.231	0.147	0.026	-0.003	0.068	-0.219	0.024	0.050	0.142	0.107	-0.078	0.161	0.882	0.083	-0.011	-0.082
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses	-0.146	0.108	-0.065	0.839	0.296	0.099	-0.008	0.198	0.050	-0.166	0.076	-0.073	0.009	-0.080	-0.148	-0.151
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses	0.123	0.039	0.028	0.821	0.057	-0.085	0.486	0.193	0.312	-0.143	0.120	-0.095	-0.118	0.104	0.257	-0.180
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding	0.083	-0.009	0.423	0.530	0.149	0.223	0.260	-0.143	0.022	0.123	0.364	-0.268	0.085	-0.091	0.047	0.277
Q7ivThe amount of formal developmental market research undertaken as to identify sources of external funding	0.081	0.138	0.122	0.630	0.098	-0.055	0.330	-0.059	0.121	-0.050	0.221	0.197	0.065	0.077	0.429	0.288
Q8i The amount of internal market research undertaken as to students views of u/g courses	0.212	-0.060	0.218	0.731	0.033	0.049	-0.094	-0.163	-0.050	0.137	-0.119	0.483	0.032	0.053	0.117	-0.044
Q8ii The amount of internal market research undertaken as to students views of p/g courses	0.443	0.353	0.507	0.386	-0.152	0.193	0.006	-0.112	-0.056	0.003	0.129	0.154	0.099	0.195	0.276	-0.030
Q8iii The amount of internal market research undertaken as to students requirements of the university	0.257	0.023	0.222	0.688	-0.230	0.012	-0.048	-0.121	0.025	0.085	0.067	0.100	0.074	0.532	0.117	0.068
Q9i Changes in the investment in marketing activity by the university	0.179	0.071	-0.003	0.405	0.173	0.142	-0.042	0.071	0.818	0.014	-0.182	0.056	0.089	-0.018	-0.044	-0.032
Q9ii Changes in the investment in marketing activity by an external body on behalf of the university	-0.164	0.511	-0.045	0.165	0.106	0.410	-0.056	-0.375	0.210	-0.355	-0.103	0.123	-0.104	0.169	-0.211	0.088
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision	0.089	0.183	0.348	0.682	0.329	0.236	0.036	-0.140	-0.111	-0.026	0.085	-0.056	0.270	-0.110	0.041	0.181
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research	-0.107	0.547	0.351	0.481	-0.003	0.196	0.003	-0.227	-0.012	0.048	0.195	-0.276	0.094	0.133	0.223	-0.018
Q11 Impact of markel research in the degree of change as indicated in Q1 - Q5	-0.208	-0.033	0.064	0.771	0.157	-0.243	0.127	0.037	0.217	-0.029	-0.095	0.048	0.182	-0.051	0.111	0.311
Q13ia.90 Influence over the appointment of full time academic staff early 1990s/ 1999	0.652	-0.136	0.214	0.222	-0.193	-0.046	-0.140	0.400	0.148	-0.231	0.111	0.189	-0.166	0.204	0.188	-0.069
Q13ia.99 Influence over the appointment of full time academic staff in 1999	-0.064	0.057	0.851	0.240	0.185	0.024	-0.068	0.144	-0.039	-0.190	0.115	0.198	0.171	-0.076	0.155	-0.017
Q13ib.90 Influence over the appointment of part time academic staff early 1990s	0.131	-0.203	0.017	-0.012	0.200	-0.166	0.026	0.867	0.136	0.182	0.097	0.009	-0.076	0.048	-0.123	0.002
Q13ib.99 Influence over the appointment of part time academic staff in 1999	0.079	0.183	0.789	0.166	0.272	-0.065	-0.094	0.021	0.020	0.107	-0.083	-0.200	-0.170	-0.324	0.015	-0.103
Q13ii.90 Influence over appointing administrative staff early 1990s	0.337	-0.305	0.465	0.110	-0.292	0.033	0.052	0.492	0.171	-0.225	0.131	0.008	-0.107	0.305	0.039	-0.164
Q13ii.99 Influence over appointing administrative staff in 1999	-0.213	0.101	0.827	0.088	0.289	0.165	-0.005	-0.034	0.057	-0.229	-0.188	0.068	-0.079	-0.082	-0.133	-0.047
Q13iii.90 Influence over appointing support services (external to the university) early 1990s	0.151	0.262	-0.394	-0.022	-0.336	0.089	0.519	0.273	0.261	0.022	0.008	0.159	0.127	0.348	0.148	-0.080
Q13iii.99 Influence over appointing support services (external to the university) in 1999	-0.031	0.431	0.151	0.200	-0.006	-0.056	0.784	0.199	0.170	0.104	0.054	-0.108	0.011	-0.052	-0.079	-0.072
Q13iv.90 Influence over the amount of remission on teaching to academic staff for research / administration early 1990s	0.378	0.043	-0.092	-0.044	-0.168	-0.032	0.050	0.853	-0.128	0.010	-0.070	-0.139	0.095	-0.058	0.023	-0.019
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration in 1999	0.128	0.548	0.370	-0.030	-0.072	0.236	-0.190	-0.074	-0.452	-0.078	-0.085	-0.155	-0.083	-0.392	-0.080	-0.170
Q14i.90 Approval to invest in IT for academic activities early 1990s	0.795	-0.207	-0.215	-0.008	0.090	-0.323	0.083	-0.017	0.077	0.129	-0.034	-0.065	-0.198	0.054	0.089	0.028
Q14i.99 Approval to invest in IT for academic activities in 1999	-0.033	0.344	0.415	-0.020	0.438	0.055	-0.308	-0.187	-0.407	0.007	0.286	-0.263	0.079	-0.103	0.041	-0.138
Q14ii.90 Approval to invest in IT for administration early 1990s	0.398	0.048	0.035	-0.128	-0.329	0.356	0.157	-0.087	0.471	-0.031	-0.214	-0.243	-0.352	0.199	-0.013	0.138
Q14ii.99 Approval to invest in IT for administration in 1999	-0.239	0.211	0.840	-0.040	0.227	0.465	-0.126	-0.179	0.090	-0.050	0.070	-0.282	0.137	0.064	0.029	0.031
Q15i.90 Authority for u/g course development and implementation early 1990s	0.441	-0.297	-0.147	-0.203	-0.377	-0.354	0.050	-0.035	-0.089	0.329	-0.387	0.073	0.087	0.211	-0.200	-0.101
Q15i.99 Authority for u/g course development and implementation in 1999	-0.186	0.078	0.893	0.012	-0.124	0.059	0.270	0.009	-0.086	0.110	0.008	0.005	0.012	0.216	0.046	-0.058
Q15ii.90 Authority for p/g course development and implementation early 1990s	0.464	-0.347	-0.093	-0.215	-0.324	-0.259	0.008	0.000	-0.166	0.354	-0.222	0.070	0.286	0.360	-0.061	-0.052
Q15ii.99 Authority for p/g course development and implementation in 1999	-0.186	0.078	0.893	0.012	-0.124	0.059	0.270	0.009	-0.086	0.110	0.008	0.005	0.012	0.216	0.046	-0.058
Q15iii.90 Authority for other course development and implementation early 1990s	0.026	-0.271	0.024	-0.013	-0.423	-0.556	0.233	0.085	-0.220	0.259	-0.121	0.020	-0.007	0.079	-0.401	-0.113
Q15iii.99 Authority for other course development and implementation in 1999	-0.360	-0.185	0.613	0.284	-0.198	-0.129	0.277	-0.177	0.144	0.147	-0.140	0.243	-0.093	0.061	-0.147	-0.087
Q16i.90 Approval of travel expenditure (UK) early 1990s	0.907	-0.120	-0.167	0.111	-0.147	-0.098	0.014	0.190	-0.009	0.095	0.033	0.089	0.015	-0.089	-0.087	-0.094
Q16i.99 Approval of travel expenditure (UK) in 1999	-0.202	0.193	0.088	0.165	0.874	-0.032	0.031	-0.035	0.030	-0.030	-0.003	0.115	-0.020	-0.103	-0.215	-0.099
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s	0.831	-0.082	-0.234	0.085	-0.180	-0.142	-0.005	0.165	0.124	0.034	0.095	0.128	0.074	-0.215	-0.033	0.082
Q16ii.99 Approval of travel expenditure (o'seas) in 1999	-0.204	0.127	0.059	0.156	0.873	0.119	-0.087	-0.035	-0.125	0.021	0.097	0.115	0.099	-0.087	-0.152	-0.068
Q16iii.90Approval of overtime expenditure early 1990s	0.714	-0.113	-0.054	-0.292	-0.008	0.332	0.202	-0.094	0.101	0.190	-0.014	-0.194	0.075	0.294	-0.051	-0.103
Q16iii.99 Approval of overtime expenditure in 1999	-0.317	0.178	0.202	0.030	0.023	0.862	0.041	-0.105	0.018	-0.041	-0.018	-0.138	-0.096	0.137	0.008	-0.080
Q16iv.90 Approval of capital expenditures early 1990s	0.920	0.097	0.030	-0.136	-0.088	-0.146	0.002	0.009	-0.055	-0.256	0.034	-0.071	-0.030	-0.056	0.016	-0.099
Q16iv.99 Approval of capital expenditures in 1999	-0.220	0.794	0.001	-0.003	0.368	0.146	0.173	-0.002	-0.020	-0.261	0.153	-0.047	0.062	0.035	0.009	-0.010
Q16v.90 Approval of conferences early 1990s	0.876	-0.057	-0.210	0.110	-0.146	-0.088	-0.142	0.226	0.102	0.118	-0.022	-0.030	0.086	-0.130	-0.024	0.007
Q16v.99 Approval of conferences in 1999	-0.136	0.190	0.123	0.158	0.867	-0.018	0.068	-0.010	0.199	0.079	0.124	-0.069	0.173	0.050	0.059	0.000
Q16vi.90 Approval of appointment of staff early 1990s	0.583	-0.348	0.093	0.266	-0.224	0.123	0.036	0.281	0.028	-0.195	0.093	0.189	-0.038	0.371	0.159	-0.107
Q16vi.99 Approval of appointment of staff in 1999	-0.302	0.278	0.279	0.284	0.199	0.495	0.293	0.077	-0.161	-0.093	0.287	0.282	-0.075	0.153	0.029	-0.168

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 37 iterations.

Appendix 34: Graphical summary of the Broader Contingent Factor Analysis (business and non-business departments)



Importance represented by a value of 0.5 or higher from the rotated component matrix

Appendix 35: Configuration of the Multi-Dimensional Scaling analysis in six dimensions (Broader Contingent Variables Q1-Q18)

Iteration history for the 6 dimensional solution (in squared distances)

Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1	0.13441	
2	0.0964	0.03801
3	0.09281	0.00359
4	0.09222	0.00059

Iterations stopped because
S-stress improvement is less than .001000

Stress and squared correlation (RSQ) in distances

RSQ values are the proportion of variance of the scaled data (disparities)
in the partition (row, matrix, or entire data) which
is accounted for by their corresponding distances.
Stress values are Kruskal's stress formula 1.

For matrix
Stress = .07258 RSQ = .96433

Configuration derived in 6 dimensions

Stimulus Coordinates

Stimulus Number	Stimulus Name	Dimension 1	2	3	4	5	6
	1VAR1	5.8923	0.3622	0.6139	-0.2435	-0.2587	0.1353
	2VAR2	-0.9941	0.65	2.3868	-0.0501	-0.7341	0.0191
	3VAR3	0.1796	-0.6944	0.3152	0.6506	-0.2109	0.2601
	4VAR4	-1.6054	0.5222	0.2537	-0.4894	0.0365	1.1425
	5VAR5	1.2498	0.6222	-0.1409	-0.9467	0.8734	0.0879
	6VAR6	0.2058	0.1846	0.513	-0.9067	0.1378	-0.7543
	7VAR7	-0.1173	-1.0283	-1.7572	0.1223	0.3626	0.254
	8VAR8	0.8917	-0.202	-0.4027	0.3693	-0.3538	0.3573
	9VAR9	-0.5281	0.3427	-1.3243	0.1153	-1.016	-0.8556
	10VAR10	0.8278	0.5786	-0.7073	0.3448	0.2272	-0.9514
	11VAR11	-0.2789	-0.1841	-0.0296	-0.5474	-0.2613	-0.0256
	12VAR12	3.3555	-1.2823	1.0962	-0.9944	-1.398	0.8516
	13VAR13	-0.3418	0.3381	1.8332	1.3918	-1.1291	-1.0751
	14VAR14	-1.8112	-0.4203	-0.7381	0.1661	-0.5155	-0.7271
	15VAR15	-1.4218	-0.318	-0.6153	-0.9778	0.9332	-0.1166
	16VAR16	-0.9138	0.6922	-0.3321	0.3322	-0.1922	-0.6583
	17VAR17	-0.0403	1.4769	0.6203	0.0748	0.1735	-0.552
	18VAR18	-2.6818	-0.3966	-0.1957	0.7705	-0.4263	-0.0663
	19VAR19	4.0179	-0.2573	-1.6565	2.1799	-0.1392	1.4072
	20VAR20	-0.7539	-1.0621	1.297	-0.7815	1.1188	0.6464
	21VAR21	1.1868	1.9587	-0.9061	-0.0157	0.1337	0.0434
	22VAR22	-0.2712	-0.3108	-0.1279	0.3843	-0.2096	-0.2157
	23VAR23	0.2617	1.1049	-0.0516	-0.5	-0.725	-0.2354
	24VAR24	0.1894	0.6515	1.6136	0.5141	0.5307	-0.168
	25VAR25	-1.6261	0.3732	1.1442	1.036	0.5927	1.218
	26VAR26	-0.4537	-0.4647	-0.7317	0.5285	0.2148	-0.7494
	27VAR27	-0.618	0.5078	-0.6987	1.7323	0.2317	-0.6802
	28VAR28	2.841	1.0193	-0.4513	-1.1133	-0.6411	0.5157
	29VAR29	-1.8382	-0.4266	-0.0909	-0.0646	-0.0807	0.3017
	30VAR30	-0.926	-0.1099	-0.2767	-0.2091	-0.2425	0.0303
	31VAR31	-1.6889	-0.8562	-0.6778	-0.8313	-0.9473	0.3731
	32VAR32	-1.3477	0.6008	0.8492	-1.2646	-0.1233	-0.4491
	33VAR33	-1.5353	-0.3925	-0.9929	-0.641	0.4934	0.5996
	34VAR34	-1.5603	0.3081	0.1231	0.1621	-0.3502	0.3188
	35VAR35	-0.5256	-1.0858	-0.6397	-0.2824	0.6837	0.338
	36VAR36	1.6071	-0.5734	0.5549	0.3161	-1.9192	-1.0754
	37VAR37	0.2011	0.8882	0.0719	-0.1551	1.3565	0.9288
	38VAR38	0.0008	-0.0743	0.137	-0.1563	-0.0175	0.0827
	39VAR39	1.1929	-2.4018	0.0731	-1.8824	1.1334	-1.7112
	40VAR40	-0.0074	1.4078	0.4281	-0.0855	0.104	0.9245
	41VAR41	-0.877	-0.3895	-0.0035	0.9377	0.4891	0.2973
	42VAR42	-0.0744	-0.0398	0.0102	0.0018	-0.0505	0.0339
	43VAR43	1.4208	-2.5272	-0.4806	0.0164	0.0456	0.5909
	44VAR44	-0.2636	-0.6558	2.1617	-0.2638	1.2852	-0.4173
	45VAR45	0.9153	-2.4325	0.24	1.2666	1.6527	-0.7751

46VAR46	0.019	2.1681	-1.0404	-0.3581	0.4887	-0.1555
47VAR47	0.9831	-0.2961	-0.5306	0.6564	0.5525	-1.3949
48VAR48	-0.9394	-0.0808	0.6534	0.9044	-0.2817	0.6389
49VAR49	-1.3595	-2.4112	-0.7631	-1.0433	-1.6157	0.1034
50VAR50	0.2245	3.3515	-0.7076	-0.2854	0.17	-0.5925
51VAR51	-0.9162	1.7172	-0.2631	-0.5105	-0.0017	0.8438
52VAR52	0.6532	-0.4524	0.3441	0.6258	-0.1798	1.0578

Appendix 36: Summary of statistically significant variables in the broader contingent variables MDS (Q1-Q18) configuration using ProFit and Logit regression at the 0.1 significant level

ProFit Regression (Likert Scale)	
Significant question	Dimension
Q1i	1,4
Q1ii	3,4,6
Q2i	5
Q2ii	2
Q3i	3,6
Q3iib	1,5
Q3iiia	1,6
Q3iiib	1
Q3iva	3,4,6
Q3ivb	1,5,6
Q4i	3
Q4ii	2,3,4
Q5i	6
Q5ii	1,5,6
Q5iv	1,4,5
Q5v	1,3,4,5
Q6i	1,3,4,5
Q6ii	4
Q6iiia	2
Q6iiib	3,5
Q6iiic	3,6
Q6iv	3,4
Q7i	1,3
Q7ii	3,4
Q7iii	1,3,4,5,6
Q7iv	1,3,4,5
Q8i	3,4
Q8ii	1,3,4,6
Q8iii	4,5,6
Q9ii	4,6
Q10i	1,2,3,5
Q10ii	1,2,3,4,6
Q11	2,3,4,5
Q13ia.90	1,2,5,6
Q13ia.99	1,2,3,4,5

Q13ib.90	1,4
Q13ib.99	1,2,4,5
Q13ii.90	1,5
Q13ii.99	1,2,6
Q13iii.90	1,2,4,5,6
Q13iii.99	1,2,4,5,6
Q13iv.90	1,2
Q13iv.99	1.2.4.5
Q14i.90	1,2,3
Q14i.99	1,2,5,6
Q14ii.90	1,2,4,5,6
Q14ii.99	1,2,4,6
Q15i.90	1,2,3,4,5,6
Q15i.99	1,2,3,4
Q15ii.90	1,2,3,4,5
Q15ii.99	1,2,3,4
Q15iii.90	1,2,3,4,5
Q15iii.99	1,2,3,4
Q16i.90	1,2,3,5,6
Q16i.99	1,2,5,6
Q16ii.90	1,2,3
Q16ii.99	1,2,5,6
Q16iii.90	1,2,3,4,6
Q16iii.99	1,2,3,4,5,6
Q16iv.90	1,2,3,4,5,6
Q16iv.99	1,2,3,5,6
Q16v.99	1.2.4
Q16v.99	1,2,4,5,6
Q16vi.90	1,2,3,4,6
Q16vi.99	1,2,3
Q17	2
Q19.90	1,2,4,6
Q19.99	1,2,3,4

Logit Regression	
Significant question	Dimension
Q20bi-c	2
Q20bii-c	4
Q20biv-c	2
Q21a-c	2
Q21b	1,3
Q22ii	5
Q23ii-c	4
Q24i-c	5
Q24iii-c	5
Q24v-c	3
Q25i	1,4
Q29-c	1,2,3,5
Q30ai-c	2
Q30aiii-c	2
Q31aii-c	3
Q31aiii-c	3
Q34	5
University Status (old/ new)	2,3,4

Appendix 37: Factor Analysis of the Broader Contingent Factor Analysis (General University Management – 'new' universities)

Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.8337	31.7617	31.7617	9.7435	18.3839	18.3839
2	9.2950	17.5377	49.2994	8.3895	15.8292	34.2131
3	5.3280	10.0528	59.3522	7.1702	13.5288	47.7419
4	5.1001	9.6229	68.9751	5.1137	9.6485	57.3904
5	3.7970	7.1641	76.1392	3.7505	7.0765	64.4669
6	2.4883	4.6949	80.8341	3.6250	6.8395	71.3064
7	2.2295	4.2066	85.0407	3.5001	6.6040	77.9105
8	2.1364	4.0309	89.0716	3.0181	5.6945	83.6050
9	1.7914	3.3799	92.4515	2.4840	4.6868	88.2918
10	1.4402	2.7173	95.1688	1.9167	3.6164	91.9082
11	0.9572	1.8061	96.9748	1.8203	3.4345	95.3427
12	0.8822	1.6645	98.6393	1.7472	3.2966	98.6393
13	0.7211	1.3607	100.0000			
14	0.0000	0.0000	100.0000			
15	0.0000	0.0000	100.0000			
16	0.0000	0.0000	100.0000			
17	0.0000	0.0000	100.0000			
18	0.0000	0.0000	100.0000			
19	0.0000	0.0000	100.0000			
20	0.0000	0.0000	100.0000			
21	0.0000	0.0000	100.0000			
22	0.0000	0.0000	100.0000			
23	0.0000	0.0000	100.0000			
24	0.0000	0.0000	100.0000			
25	0.0000	0.0000	100.0000			
26	0.0000	0.0000	100.0000			
27	0.0000	0.0000	100.0000			
28	0.0000	0.0000	100.0000			
29	0.0000	0.0000	100.0000			
30	0.0000	0.0000	100.0000			
31	0.0000	0.0000	100.0000			
32	0.0000	0.0000	100.0000			
33	0.0000	0.0000	100.0000			
34	0.0000	0.0000	100.0000			
35	0.0000	0.0000	100.0000			
36	0.0000	0.0000	100.0000			
37	0.0000	0.0000	100.0000			
38	0.0000	0.0000	100.0000			
39	0.0000	0.0000	100.0000			
40	0.0000	0.0000	100.0000			
41	0.0000	0.0000	100.0000			
42	0.0000	0.0000	100.0000			
43	0.0000	0.0000	100.0000			
44	0.0000	0.0000	100.0000			
45	0.0000	0.0000	100.0000			
46	0.0000	0.0000	100.0000			
47	0.0000	0.0000	100.0000			
48	0.0000	0.0000	100.0000			
49	0.0000	0.0000	100.0000			
50	0.0000	0.0000	100.0000			
51	0.0000	0.0000	100.0000			
52	0.0000	0.0000	100.0000			
53	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
Q5i Change of range of u/g courses	-0.32597	-0.5188	-0.51824	0.098179	0.414702	0.219645	0.113699	-0.06371	-0.08184	-0.20687	0.126942	-0.16014
Q5ii Change of range of p/g courses	-0.09484	-0.37586	-0.14045	-0.15491	0.3001	0.429869	0.061066	0.582893	0.154688	0.371996	0.147149	-0.05009
Q5iii Change of range of other courses	-0.05481	-0.1586	0.003731	-0.05845	0.080587	0.446651	-0.16523	0.215387	-0.07542	0.823222	0.048938	-0.02468
Q5iv Change of range of electives on u/g courses	-0.13745	-0.41956	-0.38517	0.060649	0.004516	-0.11725	0.003019	-0.75971	0.183544	-0.16184	-0.02541	-0.02887
Q5v Change of range of electives on p/g courses	-0.35092	-0.50802	-0.15483	0.306753	0.164566	0.299318	0.205212	-0.2113	0.306738	0.398118	-0.15654	0.140357
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	-0.09477	-0.10201	0.258751	0.217015	-0.01591	0.695077	-0.39582	0.18593	0.142768	0.045935	0.034229	-0.40793
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	-0.14929	-0.14855	0.168988	0.003739	0.113803	0.918461	-0.00967	-0.04221	-0.07908	0.160565	0.124072	0.130219
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	0.051639	-0.26867	0.150508	0.10196	0.212355	0.784411	-0.18319	0.387013	0.047151	0.159536	-0.01566	-0.06916
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses	-0.10658	0.23148	-0.0711	0.446414	0.815193	0.082279	-0.0822	0.147134	-0.14854	0.078354	0.029268	0.032635
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses	-0.15607	0.133912	0.129628	0.019681	0.900583	0.048253	0.096183	0.186169	0.200153	0.075109	0.145394	-0.11555
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding	-0.25856	-0.29734	0.398362	-0.00284	0.543909	0.165531	0.108512	0.494746	0.182102	0.065699	-0.16607	-0.08291
Q7ivThe amount of formal developmental market research undertaken as to identify sources of external funding	0.029037	-0.58097	0.137562	0.112013	0.288609	0.166045	0.118788	-0.01983	0.198583	0.080602	0.252089	-0.61419
Q8i The amount of internal market research undertaken as to students views of u/g courses	-0.1528	0.059795	-0.3079	0.81166	0.203997	-0.04974	0.287263	-0.15621	-0.13767	0.121928	0.089978	-0.04288
Q8ii The amount of internal market research undertaken as to students views of p/g courses	0.056364	-0.04979	-0.123	0.930755	0.193376	0.070611	0.131756	-0.20773	0.048571	-0.05898	-0.05248	0.005561
Q8iii The amount of internal market research undertaken as to students requirements of the university	-0.13144	0.173899	0.200247	0.883096	0.035293	-0.07203	-0.09782	0.235309	0.11872	0.004072	-0.08715	0.084345
Q9i Changes in the investment in marketing activity by the university	0.025763	-0.12802	-0.09299	0.599921	0.517297	0.195677	0.049413	0.162532	-0.02305	0.211482	0.472275	0.061536
Q9ii Changes in the investment in marketing activity by an external body on behalf of the university	0.096551	-0.09549	0.204742	0.682428	-0.32164	0.227446	-0.37281	0.06788	0.176419	-0.26197	0.147558	-0.23103
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision	-0.00689	-0.08117	0.064462	0.602631	0.161335	0.155418	0.078271	0.494823	0.474589	-0.22461	0.201918	-0.02187
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research	0.036273	-0.07541	0.127512	0.452942	0.350242	0.188782	0.008454	0.619715	0.382865	0.048326	0.125854	0.243677
Q13ia.90 Influence over the appointment of full time academic staff early 1990s/ 1999	0.177339	0.892573	0.196249	-0.16404	0.157703	0.057639	0.081462	-0.07085	0.042605	0.027892	0.220841	0.122901
Q13ia.99 Influence over the appointment of full time academic staff in 1999	0.585583	0.297047	0.208323	-0.09844	-0.02467	0.22799	0.385625	0.128497	0.263222	-0.08962	0.442198	0.012433
Q13ib.90 Influence over the appointment of part time academic staff early 1990s	0.77163	0.414277	-0.13409	0.005554	0.050858	-0.32005	-0.05203	-0.02641	0.257354	-0.07827	0.080588	-0.10614
Q13ib.99 Influence over the appointment of part time academic staff in 1999	0.845175	0.047535	0.096064	0.005207	-0.14337	0.010318	0.2139	0.136578	0.208605	-0.06907	0.351347	-0.05478
Q13ii.90 Influence over appointing administrative staff early 1990s	0.26706	0.817171	0.375221	0.064413	0.165527	0.08321	0.051776	0.199512	0.092482	-0.10636	0.029667	-0.11508
Q13ii.99 Influence over appointing administrative staff in 1999	0.640162	0.254723	0.2059	-0.03217	-0.00912	0.227413	0.449866	0.113947	-0.01047	-0.16739	0.302714	-0.22388
Q13iii.90 Influence over appointing support services (external to the university) early 1990s	0.221941	0.878668	0.272706	0.206445	0.129505	-0.0352	0.080773	0.030137	0.10513	0.046273	-0.0299	-0.01565
Q13iii.99 Influence over appointing support services (external to the university) in 1999	0.248388	0.427447	0.450707	0.046878	0.177446	0.163513	0.413007	0.252493	0.370084	0.002084	-0.07449	0.324614
Q13iv.90 Influence over the amount of remission on teaching to academic staff for research / administration early 1990s	0.272369	0.734627	-0.12651	0.051961	-0.02529	-0.19556	0.290254	-0.27564	-0.09272	-0.18429	0.262441	0.232216
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration in 1999	0.550894	0.412184	0.128086	0.058597	-0.11552	0.051092	0.579252	-0.04797	-0.14597	-0.14536	0.079202	0.036442
Q14i.90 Approval to invest in IT for academic activities early 1990s	0.016613	0.917967	0.11927	0.183812	-0.14359	-0.14889	0.078035	-0.04542	-0.13406	-0.17898	-0.06073	-0.03352
Q14i.99 Approval to invest in IT for academic activities in 1999	0.250961	0.09813	0.139245	0.063748	-0.05811	-0.18147	0.893241	-0.10308	0.054584	-0.03978	0.118042	0.110557
Q14ii.90 Approval to invest in IT for administration early 1990s	0.066361	0.895225	-0.07639	-0.04834	0.077996	-0.15001	0.13414	0.071623	-0.29008	-0.00657	-0.18077	-0.08755
Q14ii.99 Approval to invest in IT for administration in 1999	0.364933	0.004891	0.004542	0.061395	0.094058	-0.1338	0.868097	0.149263	0.025857	-0.00189	0.036256	-0.09321
Q15i.90 Authority for u/g course development and implementation early 1990s	0.02833	0.297127	0.909518	-0.16674	0.130159	0.062822	0.06912	-0.03416	0.086617	0.143519	0.028452	-0.0108
Q15i.99 Authority for u/g course development and implementation in 1999	0.395506	-0.1093	0.876498	0.126496	0.036109	0.054764	0.030829	0.058233	0.022338	-0.09481	0.142553	0.087654
Q15ii.90 Authority for p/g course development and implementation early 1990s	0.034145	0.298047	0.911294	-0.158	0.126983	0.069577	0.059548	-0.03886	0.074198	0.148196	0.030693	-0.01187
Q15ii.99 Authority for p/g course development and implementation in 1999	0.395506	-0.1093	0.876498	0.126496	0.036109	0.054764	0.030829	0.058233	0.022338	-0.09481	0.142553	0.087654
Q15iii.90 Authority for other course development and implementation early 1990s	0.203432	0.249956	0.855875	-0.10357	0.078971	0.192734	0.03678	0.261383	-0.00563	-0.11062	-0.04174	-0.15565
Q15iii.99 Authority for other course development and implementation in 1999	0.486167	0.056775	0.680796	0.079908	-0.14375	0.070278	0.035542	0.420514	0.053903	-0.25298	-0.01664	-0.14018
Q16i.90 Approval of travel expenditure (UK) early 1990s	0.888482	0.185889	0.03121	-0.27072	0.101421	-0.1317	0.094676	0.079984	-0.02819	0.180766	0.03741	-0.12133
Q16i.99 Approval of travel expenditure (UK) in 1999	0.872546	0.069208	0.258392	0.153468	-0.19828	0.003388	0.167124	0.001484	0.087492	-0.14911	0.126908	-0.01949
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s	0.570423	0.367839	0.230903	-0.45829	0.173926	0.093185	0.120775	-0.03098	-0.21312	0.346767	-0.05878	0.183336
Q16ii.99 Approval of travel expenditure (o'seas) in 1999	0.719077	0.266739	0.442287	-0.00787	-0.09633	0.262442	0.212477	-0.03312	-0.11279	0.004099	0.035229	0.166915
Q16iii.90Approval of overtime expenditure early 1990s	0.686496	0.347662	0.035021	-0.22541	0.107135	-0.36965	0.091078	-0.02647	-0.18873	0.189954	-0.18534	0.301437
Q16iii.99 Approval of overtime expenditure in 1999	0.8883	0.16109	0.187012	0.076004	-0.08006	-0.14124	0.232528	-0.05585	-0.18318	-0.07344	-0.05415	0.133498
Q16iv.90 Approval of capital expenditures early 1990s	0.353569	0.684605	-0.1305	-0.20593	0.112147	-0.31727	-0.00025	-0.16469	-0.34144	0.182891	0.106721	0.20513
Q16iv.99 Approval of capital expenditures in 1999	0.515863	0.035142	0.450096	0.229962	0.079051	0.1028	0.24442	0.177913	0.16604	0.098375	0.131344	0.560754
Q16v.90 Approval of conferences early 1990s	0.764561	0.207021	0.204822	-0.42653	0.123061	-0.16267	0.039356	-0.19587	-0.08741	0.181197	-0.0998	0.112189
Q16v.99 Approval of conferences in 1999	0.873414	0.007232	0.435084	0.051781	-0.09803	0.022115	0.003168	-0.02357	0.077391	-0.11093	-0.06916	0.103003
Q16vi.90 Approval of appointment of staff early 1990s	0.415674	0.701766	0.217726	-0.28871	0.138506	-0.24066	-0.16203	0.080412	0.1329	0.114637	0.06784	0.229177
Q16vi.99 Approval of appointment of staff in 1999	0.47878	0.094832	0.295738	0.152215	0.115804	0.144774	0.263498	0.067111	0.024385	0.045831	0.724115	-0.10566

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
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Rotation converged in 16 iterations.

Appendix 38: Factor Analysis of the Broader Contingent Factor Analysis (General University Management – 'old' universities)

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.7629	20.3073	20.3073	7.0971	13.3908	13.3908
2	8.7093	16.4326	36.7400	6.7669	12.7677	26.1585
3	5.6645	10.6877	47.4276	6.6330	12.5151	38.6736
4	5.2215	9.8518	57.2795	4.9113	9.2666	47.9402
5	4.2670	8.0509	65.3303	4.4607	8.4164	56.3566
6	3.8108	7.1902	72.5205	3.6430	6.8737	63.2303
7	3.1117	5.8711	78.3915	3.6357	6.8597	70.0900
8	2.7856	5.2558	83.6474	3.0769	5.8056	75.8956
9	2.2282	4.2042	87.8516	2.8819	5.4376	81.3332
10	1.7530	3.3075	91.1591	2.5151	4.7454	86.0786
11	1.3190	2.4887	93.6478	2.3715	4.4744	90.5531
12	1.2247	2.3108	95.9586	2.1805	4.1141	94.6672
13	1.0762	2.0305	97.9891	1.7606	3.3220	97.9891
14	0.6664	1.2574	99.2466			
15	0.3993	0.7534	100.0000			
16	0.0000	0.0000	100.0000			
17	0.0000	0.0000	100.0000			
18	0.0000	0.0000	100.0000			
19	0.0000	0.0000	100.0000			
20	0.0000	0.0000	100.0000			
21	0.0000	0.0000	100.0000			
22	0.0000	0.0000	100.0000			
23	0.0000	0.0000	100.0000			
24	0.0000	0.0000	100.0000			
25	0.0000	0.0000	100.0000			
26	0.0000	0.0000	100.0000			
27	0.0000	0.0000	100.0000			
28	0.0000	0.0000	100.0000			
29	0.0000	0.0000	100.0000			
30	0.0000	0.0000	100.0000			
31	0.0000	0.0000	100.0000			
32	0.0000	0.0000	100.0000			
33	0.0000	0.0000	100.0000			
34	0.0000	0.0000	100.0000			
35	0.0000	0.0000	100.0000			
36	0.0000	0.0000	100.0000			
37	0.0000	0.0000	100.0000			
38	0.0000	0.0000	100.0000			
39	0.0000	0.0000	100.0000			
40	0.0000	0.0000	100.0000			
41	0.0000	0.0000	100.0000			
42	0.0000	0.0000	100.0000			
43	0.0000	0.0000	100.0000			
44	0.0000	0.0000	100.0000			
45	0.0000	0.0000	100.0000			
46	0.0000	0.0000	100.0000			
47	0.0000	0.0000	100.0000			
48	0.0000	0.0000	100.0000			
49	0.0000	0.0000	100.0000			
50	0.0000	0.0000	100.0000			
51	0.0000	0.0000	100.0000			
52	0.0000	0.0000	100.0000			
53	0.0000	0.0000	100.0000			

Extraction Method: Principal Component Analysis.

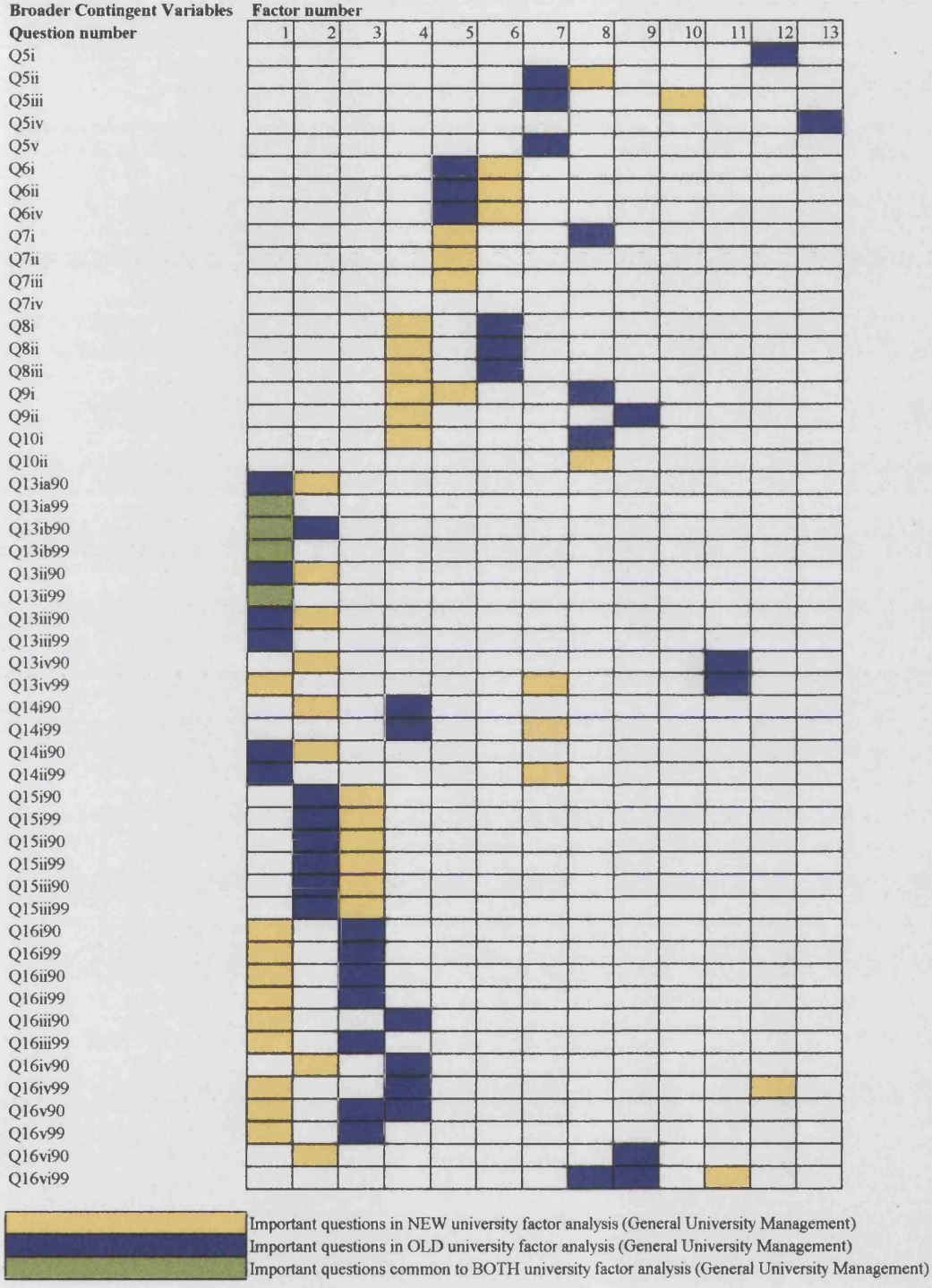
Rotated Component Matrix

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Q5i Change of range of u/g courses	-0.184355	0.084756	0.217329	-0.273354	0.063391	-0.029046	-0.116377	0.030041	0.071976	0.058518	-0.038906	0.854325	0.154288
Q5ii Change of range of p/g courses	-0.087531	0.224537	-0.122557	-0.16777	-0.184233	-0.063556	0.848748	-0.029539	0.065003	0.218384	0.252703	-0.116651	0.08104
Q5iii Change of range of other courses	0.036797	0.290627	-0.1714	0.257117	-0.070312	0.27156	0.842312	-0.080296	-0.119253	0.063112	0.006022	-0.005721	-0.027089
Q5iv Change of range of electives on u/g courses	0.255081	0.293193	-0.186249	-0.175683	0.190932	0.044426	0.261852	-0.041367	0.051313	-0.068408	-0.098668	0.393797	0.690026
Q5v Change of range of electives on p/g courses	0.206978	0.296575	-0.112477	-0.092825	0.431911	-0.165679	0.679039	-0.08767	0.258841	0.067825	0.093263	0.070549	0.257831
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research	0.139859	-0.173331	-0.002462	0.057321	0.93287	0.068456	-0.167529	-0.080167	-0.076025	0.028085	-0.011701	0.073498	0.121806
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output	0.049504	-0.081422	0.01705	0.051764	0.967107	0.09649	0.004141	0.038615	0.167462	0.071923	0.033668	-0.029402	0.041532
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation	-0.182831	0.072241	0.291489	0.082401	0.763577	0.207245	0.211408	-0.202105	0.201362	-0.231347	0.136808	-0.054738	-0.145016
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses	-0.097308	0.053553	-0.270223	-0.079047	-0.121103	0.417532	-0.142362	0.668852	0.266456	-0.318653	-0.027877	0.124671	0.224041
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses	-0.049873	-0.044198	-0.371867	0.174965	0.039948	0.127479	-0.081033	0.397572	0.486051	-0.273459	0.204105	0.377455	0.37307
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding	0.362157	-0.294844	0.108946	0.049498	-0.343208	-0.006623	0.196893	0.158786	0.492486	-0.107515	0.127402	0.493476	0.044989
Q7ivThe amount of formal developmental market research undertaken as to identify sources of external funding	0.346667	-0.409517	-0.217895	0.043178	-0.351524	-0.05725	0.474431	-0.087915	0.380351	-0.276081	0.035069	0.222667	-0.146284
Q8i The amount of internal market research undertaken as to students views of u/g courses	0.013381	-0.150614	0.053619	-0.0404	0.065643	0.916437	-0.018488	0.293457	-0.006388	0.157914	-0.079151	0.10273	-0.008516
Q8ii The amount of internal market research undertaken as to students views of p/g courses	-0.083979	-0.076581	0.000814	0.122607	0.329039	0.711642	0.07821	-0.069782	0.349211	0.285117	0.151183	0.162737	0.126794
Q8iii The amount of internal market research undertaken as to students requirements of the university	-0.191941	-0.022585	-0.171376	-0.10953	0.105996	0.845366	0.106258	0.074427	0.138542	-0.133595	-0.122832	-0.290387	-0.034593
Q9i Changes in the investment in marketing activity by the university	-0.106743	-0.269738	0.244088	0.182372	-0.217014	0.129366	-0.237131	0.747164	-0.064568	-0.077655	-0.032311	0.286178	-0.172175
Q9ii Changes in the investment in marketing activity by an external body on behalf of the university	0.093786	0.00417	0.035947	-0.261415	0.21367	0.224377	0.003622	0.158761	0.866161	0.098511	0.117482	0.110774	0.013721
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision	0.120184	-0.166087	-0.154668	0.029004	0.001931	0.062492	0.037733	0.869939	0.063626	0.270553	0.072344	-0.130256	-0.032099
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research	0.179097	-0.235677	-0.633728	-0.073669	-0.285728	0.224226	0.089304	0.005541	0.243978	0.282259	-0.089741	0.407271	0.008097
Q13ia.90 Influence over the appointment of full time academic staff early 1990s/ 1999	0.762472	0.417186	-0.04251	-0.152098	0.10251	0.036661	0.126273	-0.053164	0.087724	0.352543	-0.108264	0.117105	-0.068071
Q13ia.99 Influence over the appointment of full time academic staff in 1999	0.802379	0.353403	-0.118153	-0.213264	0.251746	0.125173	0.089891	-0.139128	0.174663	0.104298	-0.091884	0.029215	0.11376
Q13ib.90 Influence over the appointment of part time academic staff early 1990s	0.574203	0.575926	0.064771	0.10131	-0.370977	-0.110852	0.069203	-0.16612	0.239089	0.126907	0.225156	0.067193	0.027034
Q13ib.99 Influence over the appointment of part time academic staff in 1999	0.806249	0.29656	0.012841	-0.156301	-0.000127	-0.035274	-0.053249	0.261285	0.201178	-0.121336	0.264038	-0.117961	-0.012251
Q13ii.90 Influence over appointing administrative staff early 1990s	0.754899	0.27258	0.036698	0.031831	-0.199633	-0.059446	0.167779	-0.150361	0.262273	0.142697	0.287636	0.034262	0.231914
Q13ii.99 Influence over appointing administrative staff in 1999	0.774422	0.145129	0.017746	-0.007784	-0.022012	0.065193	0.162411	0.253666	0.150181	-0.118186	0.397751	-0.144966	0.251773
Q13iii.90 Influence over appointing support services (external to the university) early 1990s	0.869661	0.043812	0.064487	0.009336	-0.197101	-0.090359	-0.134688	-0.273311	-0.141048	0.050909	-0.130441	0.201627	0.018185
Q13iii.99 Influence over appointing support services (external to the university) in 1999	0.862573	-0.057034	-0.014216	-0.170496	0.148973	-0.034195	-0.057093	-0.021324	-0.286798	-0.288355	-0.02118	-0.127036	0.048099
Q13iv.90 Influence over the amount of remission on teaching to academic staff for research / administration early 1990s	0.296459	0.372217	0.324627	0.077666	-0.042097	-0.106161	0.188281	0.007804	0.157313	0.001167	0.734636	0.093426	-0.044026
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration in 1999	0.248879	0.360202	0.224297	-0.017582	0.299452	-0.028067	0.196092	0.039628	0.037011	-0.14089	0.762687	-0.142212	0.02658
Q14i.90 Approval to invest in IT for academic activities early 1990s	-0.051397	0.010897	0.40661	0.807715	0.055271	-0.123357	0.29998	0.154911	-0.089426	0.036479	0.05222	-0.010794	-0.09641
Q14i.99 Approval to invest in IT for academic activities in 1999	-0.339374	-0.14985	0.083968	0.769491	0.076589	-0.330892	-0.135543	0.217049	-0.063796	-0.163421	0.14458	-0.00572	0.171859
Q14ii.90 Approval to invest in IT for administration early 1990s	0.762915	-0.128305	0.014931	0.338388	0.074327	-0.198892	0.003681	0.287219	-0.021679	-0.063554	0.109376	-0.125038	-0.339824
Q14ii.99 Approval to invest in IT for administration in 1999	0.569185	-0.257156	0.0251	0.163471	0.215989	-0.381672	-0.083032	0.327804	0.162565	-0.123694	0.250144	-0.115832	-0.385812
Q15i.90 Authority for u/g course development and implementation early 1990s	0.098403	0.943687	-0.1019	0.140125	-0.067728	-0.123743	0.190551	0.017615	0.044685	0.00903	0.084142	-0.014692	0.039123
Q15i.99 Authority for u/g course development and implementation in 1999	0.00602	0.875518	-0.13548	0.077313	0.14347	-0.248473	0.258521	-0.014509	0.097514	-0.086708	0.171686	-0.101143	0.049238
Q15ii.90 Authority for p/g course development and implementation early 1990s	0.220289	0.913394	-0.007191	-0.086642	-0.257324	-0.016962	0.133252	-0.021967	-0.105354	0.075963	0.00119	-0.001492	0.086828
Q15ii.99 Authority for p/g course development and implementation in 1999	0.179746	0.913279	-0.02849	-0.218272	-0.125784	-0.069225	0.168742	-0.079313	-0.10365	-0.013679	0.021852	-0.068142	0.093713
Q15iii.90 Authority for other course development and implementation early 1990s	0.18706	0.712605	0.023514	0.140029	0.041061	0.428735	-0.142388	-0.235812	-0.005944	0.326917	0.152749	0.197877	-0.023913
Q15iii.99 Authority for other course development and implementation in 1999	0.113066	0.741903	0.026389	-0.069915	0.218569	0.366077	-0.144062	-0.302362	0.022274	0.201707	0.189538	0.194415	-0.027007
Q16i.90 Approval of travel expenditure (UK) early 1990s	0.158871	-0.007783	0.793624	0.332306	-0.320583	0.204345	-0.098593	-0.16135	0.069276	0.186463	0.020777	0.047881	0.10143
Q16i.99 Approval of travel expenditure (UK) in 1999	0.015738	-0.03099	0.96311	0.023947	0.037087	0.020395	-0.071678	0.027698	-0.089904	-0.026513	0.001101	0.105806	-0.10885
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s	0.158871	-0.007783	0.793624	0.332306	-0.320583	0.204345	-0.098593	-0.16135	0.069276	0.186463	0.020777	0.047881	0.10143
Q16ii.99 Approval of travel expenditure (o'seas) in 1999	-0.085405	-0.086616	0.911926	0.190844	0.196691	-0.145087	0.015803	0.085328	0.026141	-0.035384	0.151615	0.062995	-0.097285
Q16iii.90Approval of overtime expenditure early 1990s	0.115055	-0.244183	0.47085	0.637493	-0.165249	0.078542	-0.345043	-0.189384	-0.159793	0.160664	-0.132348	-0.131276	0.142554
Q16iii.99 Approval of overtime expenditure in 1999	-0.120791	-0.291498	0.697216	0.07587	0.108731	-0.241332	-0.344773	-0.29567	-0.150251	-0.143154	0.063367	-0.120158	0.257482
Q16iv.90 Approval of capital expenditures early 1990s	-0.028129	0.088792	0.308241	0.922739	0.101972	0.091348	-0.007807	-0.075406	0.027492	0.030748	-0.07372	0.006558	-0.045494
Q16iv.99 Approval of capital expenditures in 1999	-0.032425	0.008822	0.166351	0.941527	0.043097	0.018156	0.060448	0.055434	-0.041778	0.121375	0.034409	-0.2037	-0.075019
Q16v.90 Approval of conferences early 1990s	0.087495	0.107263	0.72488	0.58634	-0.049227	0.089135	-0.143947	-0.104599	0.146292	0.163616	-0.03905	0.083817	-0.035835
Q16v.99 Approval of conferences in 1999	-0.085405	-0.086616	0.911926	0.190844	0.196691	-0.145087	0.015803	0.085328	0.026141	-0.035384	0.151615	0.062995	-0.097285
Q16vi.90 Approval of appointment of staff early 1990s	0.459163	0.209667	-0.15564	0.101762	0.280061	0.269859	0.399285	-0.099285	0.50389	-0.11687	-0.085974	-0.127342	-0.13018
Q16vi.99 Approval of appointment of staff in 1999	0.079954	0.007807	0.008585	0.103082	0.35908	0.082908	0.500731	-0.097521	0.520867	-0.029837	-0.495479	-0.187581	0.154707

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 32 iterations.

Appendix 39: Graphical summary of the Broader Contingent Factor Analysis (General University Management – 'new' and 'old' universities)



Importance represented by a value of 0.5 or higher from the rotated component matrix

Appendix 40: Configuration of the Multi-Dimensional Scaling analysis in six dimensions for the General University Management (SPSS Warning)

>Warning # 14654

>The total number of parameters being estimated (the number of stimulus
>coordinates plus the number of weights, if any) is large relative to the
>number of data values in your data matrix. The results may not be reliable
>since there may not be enough data to precisely estimate the values of the
>parameters. You should reduce the number of parameters (e.g. request
>fewer dimensions) or increase the number of observations.

>Number of parameters is 180. Number of data values is 435

Iteration history for the 6 dimensional solution (in squared distances)

Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1	0.07918	
2	0.05977	0.01941
3	0.05748	0.00229
4	0.05679	0.00069

Iterations stopped because
S-stress improvement is less than .001000

Stress and squared correlation (RSQ) in distances

RSQ values are the proportion of variance of the scaled data (disparities)
in the partition (row, matrix, or entire data) which
is accounted for by their corresponding distances.
Stress values are Kruskal's stress formula 1.

Appendix 41: Configuration of the Multi-Dimensional Scaling analysis in six dimensions for the General University Management (Broader Contingent Variables Q1-Q18)

Iteration history for the 5 dimensional solution (in squared distances)

Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1	0.10681	
2	0.0792	0.02761
3	0.07583	0.00337
4	0.07485	0.00098

Iterations stopped because
S-stress improvement is less than .001000

Stress and squared correlation (RSQ) in distances

RSQ values are the proportion of variance of the scaled data (disparities)
in the partition (row, matrix, or entire data) which
is accounted for by their corresponding distances.
Stress values are Kruskal's stress formula 1.

For matrix
Stress = .05969 RSQ = .97180

Configuration derived in 5 dimensions

Stimulus Coordinates

Stimulus Number	Stimulus Name	Dimension 1	2	3	4	5
	1VAR1	0.8779	2.034	-0.9637	0.5196	0.8485
	2VAR2	-1.1854	-0.2165	-0.1139	-0.3891	0.2079
	3VAR3	1.8817	2.3495	1.0289	0.3781	0.831
	4VAR4	-2.5547	0.2585	-0.6982	-0.2124	-0.3062
	5VAR5	-0.27	-0.1624	-0.3695	0.2237	0.409
	6VAR6	-1.0668	1.9292	-1.0216	-0.1002	0.1361
	7VAR7	0.5026	-0.7523	-0.487	-0.4733	0.3802
	8VAR8	-1.023	-0.4782	-0.1238	1.1682	0.3308
	9VAR9	-1.5701	0.1819	0.5613	-0.391	0.3983
	10VAR10	1.998	-0.293	-0.064	1.0493	-0.605
	11VAR11	2.0048	-0.5333	-0.1171	-0.7541	0.0619
	12VAR12	-2.4401	-0.7523	-0.4614	0.1037	0.761
	13VAR13	-0.865	0.6245	-0.5841	-0.341	-0.9541
	14VAR14	0.9679	1.8706	2.0037	0.1284	0.3258
	15VAR15	-2.5459	-0.1366	-0.3522	-0.5375	0.3424
	16VAR16	-1.0435	0.358	2.5396	-0.8265	0.1724
	17VAR17	-0.0939	-1.4118	-0.4099	0.0691	0.7385
	18VAR18	0.3779	0.603	0.0613	-0.4145	-0.343
	19VAR19	-0.5106	-0.5311	0.3552	-1.3873	-1.85
	20VAR20	4.4043	-1.4748	-0.3394	-0.8256	0.0462
	21VAR21	0.7376	-1.4141	-0.6714	1.1116	-0.3158
	22VAR22	0.7344	0.2799	0.1883	1.0714	-1.3739
	23VAR23	-0.501	-0.8167	-0.1181	0.2371	0.5888
	24VAR24	0.9571	-1.1454	0.4027	-1.0858	0.375
	25VAR25	-1.4415	-1.7099	0.9532	0.7338	-0.4037
	26VAR26	0.1291	2.0683	-0.88	0.1113	-0.2747
	27VAR27	-0.1507	-0.3525	0.3872	0.5236	0.1317
	28VAR28	0.5081	-0.9013	0.2496	0.5304	0.08
	29VAR29	0.0625	-0.2249	0.8601	0.3577	-0.3946
	30VAR30	1.1184	0.7499	-1.8158	-0.5785	-0.3444

Change in Management Accounting in UK Universities during the 1990s

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ProFit Regression – Q1i

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	DIM6, DIM4, DIM2, DIM5, DIM3, DIM1[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Q1.1 Change of delivery of u/g course

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.741[a]	.549	.489	.70

a. Predictors: (Constant), DIM6, DIM4, DIM2, DIM5, DIM3, DIM1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.739	6	4.456	9.135	.000[a]
	Residual	21.953	45	.488		
	Total	48.692	51			

a. Predictors: (Constant), DIM6, DIM4, DIM2, DIM5, DIM3, DIM1

b. Dependent Variable: Q1.1 Change of delivery of u/g course

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.423	.097		35.341	.000
	DIM1	.180	.071	.254	2.531	.015
	DIM2	.507	.091	.557	5.560	.000
	DIM3	.374	.101	.371	3.701	.001
	DIM4	.153	.108	.142	1.419	.163
	DIM5	-.200	.115	-.173	-1.728	.091
	DIM6	-3.64E-02	.128	-.029	-.284	.778

a. Dependent Variable: Q1.1 Change of delivery of u/g course

Logit Regression – Q20ai-c

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	7.853	6	.249
	Block	7.853	6	.249
	Model	7.853	6	.249

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	50.630	.140	.208

Classification Table[a]

			Predicted		
			Q20a.1.c: Change in Accounting records to identify revenue at the academic dept. level over time		Percentage Correct
	Observed		No	Yes	
Step 1	Q20a.1.c: Change in Accounting records to identify revenue at the academic dept. level over time	No	37	2	94.9
		Yes	10	3	23.1
	Overall Percentage				76.9

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	DIM1	-.322	.307	1.099	1	.294	.725
	DIM2	-.237	.321	.545	1	.460	.789
	DIM3	-.729	.389	3.507	1	.061	.482
	DIM4	-.051	.377	.019	1	.891	.950
	DIM5	-.568	.480	1.401	1	.237	.567
	DIM6	.655	.478	1.877	1	.171	1.925
	Constant	-1.345	.386	12.115	1	.001	.261

a. Variable(s) entered on step 1: DIM1, DIM2, DIM3, DIM4, DIM5, DIM6.

Logit Regression – Category of academic department

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	18.099	6	.006
	Block	18.099	6	.006
	Model	18.099	6	.006

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	52.053	.294	.397

Classification Table[a]

			Predicted		
			Business or non business department		
	Observed		Business Dept	Non Business Dept	Percentage Correct
Step 1	Business or non business department	Business Dept	26	5	83.9
		Non Business Dept	8	13	61.9
	Overall Percentage				75.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	DIM1	.330	.250	1.750	1	.186	1.391
	DIM2	.823	.383	4.614	1	.032	2.276
	DIM3	1.355	.515	6.929	1	.008	3.876
	DIM4	.395	.389	1.033	1	.309	1.485
	DIM5	.928	.485	3.665	1	.056	2.530
	DIM6	.542	.467	1.344	1	.246	1.719
	Constant	-.704	.382	3.398	1	.065	.495

a. Variable(s) entered on step 1: DIM1, DIM2, DIM3, DIM4, DIM5, DIM6.

Logit Regression – University status

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	16.002	6	.014
	Block	16.002	6	.014
	Model	16.002	6	.014

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	48.442	.283	.384

Classification Table[a]

			Predicted		
			New or Old University		
	Observed		Old University	New University	Percentage Correct
Step 1	New or Old University	Old University	13	6	68.4
		New University	4	25	86.2
	Overall Percentage				79.2

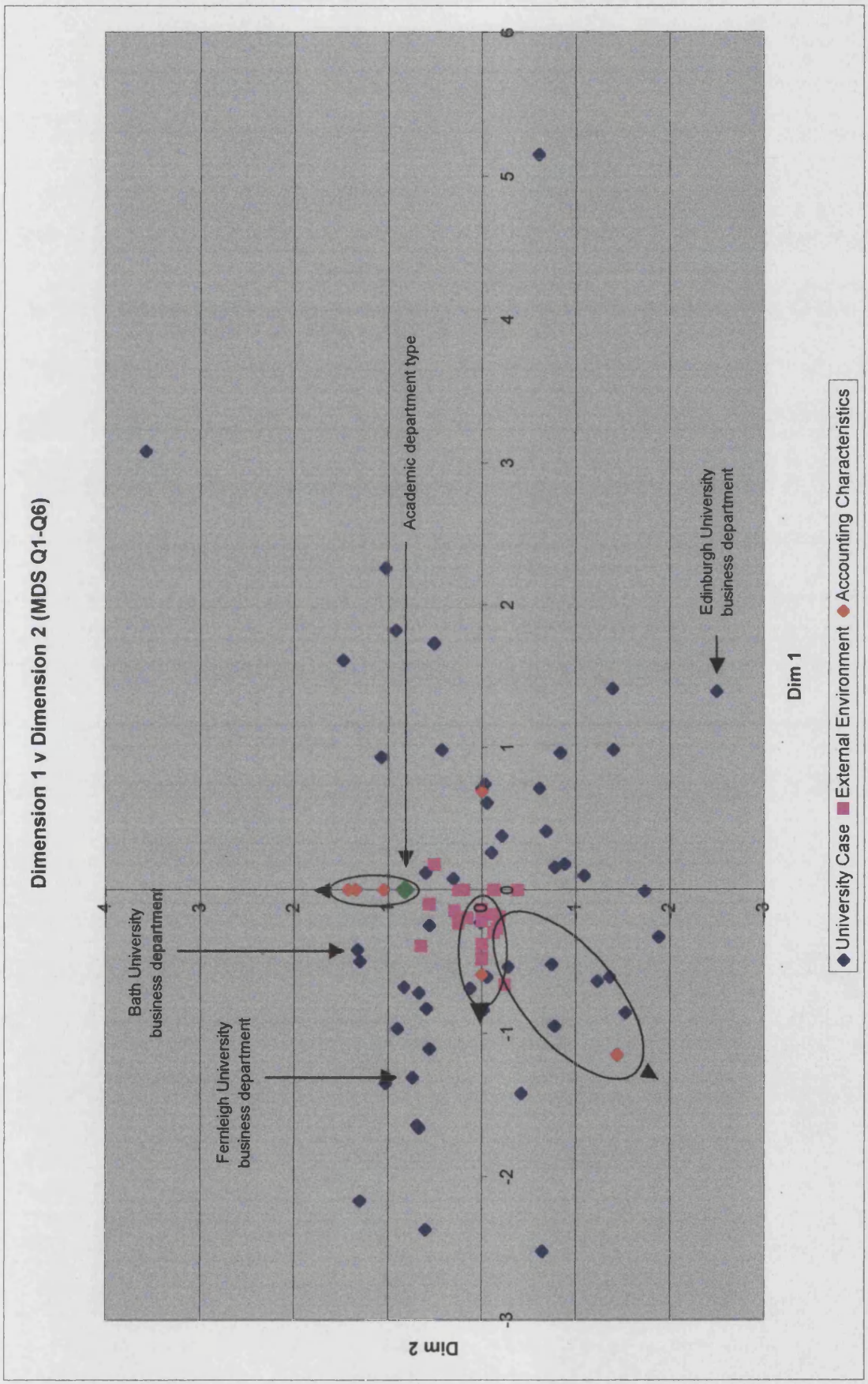
a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	DIM1	.459	.279	2.698	1	.100	1.582
	DIM2	-.294	.373	.623	1	.430	.745
	DIM3	.214	.399	.288	1	.591	1.239
	DIM4	.981	.465	4.453	1	.035	2.666
	DIM5	-.883	.491	3.237	1	.072	.414
	DIM6	.967	.487	3.940	1	.047	2.631
	Constant	.612	.367	2.781	1	.095	1.844

a. Variable(s) entered on step 1: DIM1, DIM2, DIM3, DIM4, DIM5, DIM6.

Appendix II - B: Graphical representation of dimension 1 v dimension 2 (MDS External Environment – Q1-Q6)



Dimension 1 v Dimension 2 (MDS Q1-Q6)

East/ West Direction

Q3i Entry details in terms of 'A' Level points for u/g
Q4i Financial incentives offered to students to study on u/g courses
Q4ii Financial incentives offered to students to study on p/g courses
Q5i Change of range of u/g courses
Q5ii Change of range of p/g courses
Q5iv Change of range of electives on u/g courses
Q5v Change of range of electives on p/g courses
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research
Q20bi-c AIS Change: Staff budgets (pay) in existance at academic dept level
Q34 AIS Change: Transfer pricing policies been developed as a result of budgetary devolution

South/ North Direction

Q2i Use of IT to deliver u/g courses
Q2ii Use of IT to deliver p/g courses
Q5iii Change of range of other courses
Category of academic department
Q30i-c AIS Change: Academic dept keeping records of revenue and costs of ug courses
Q30ii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses
Q33b: AIS Change: Subsequent move to recentralise budgetary devolution

Southerly direction...

Q3iiib Geographic catchment area of p/g
Q6iiia Change of research requirements in terms of age profile of students registering for research
Q6iiib Change of research requirements in terms of number of students registering for research

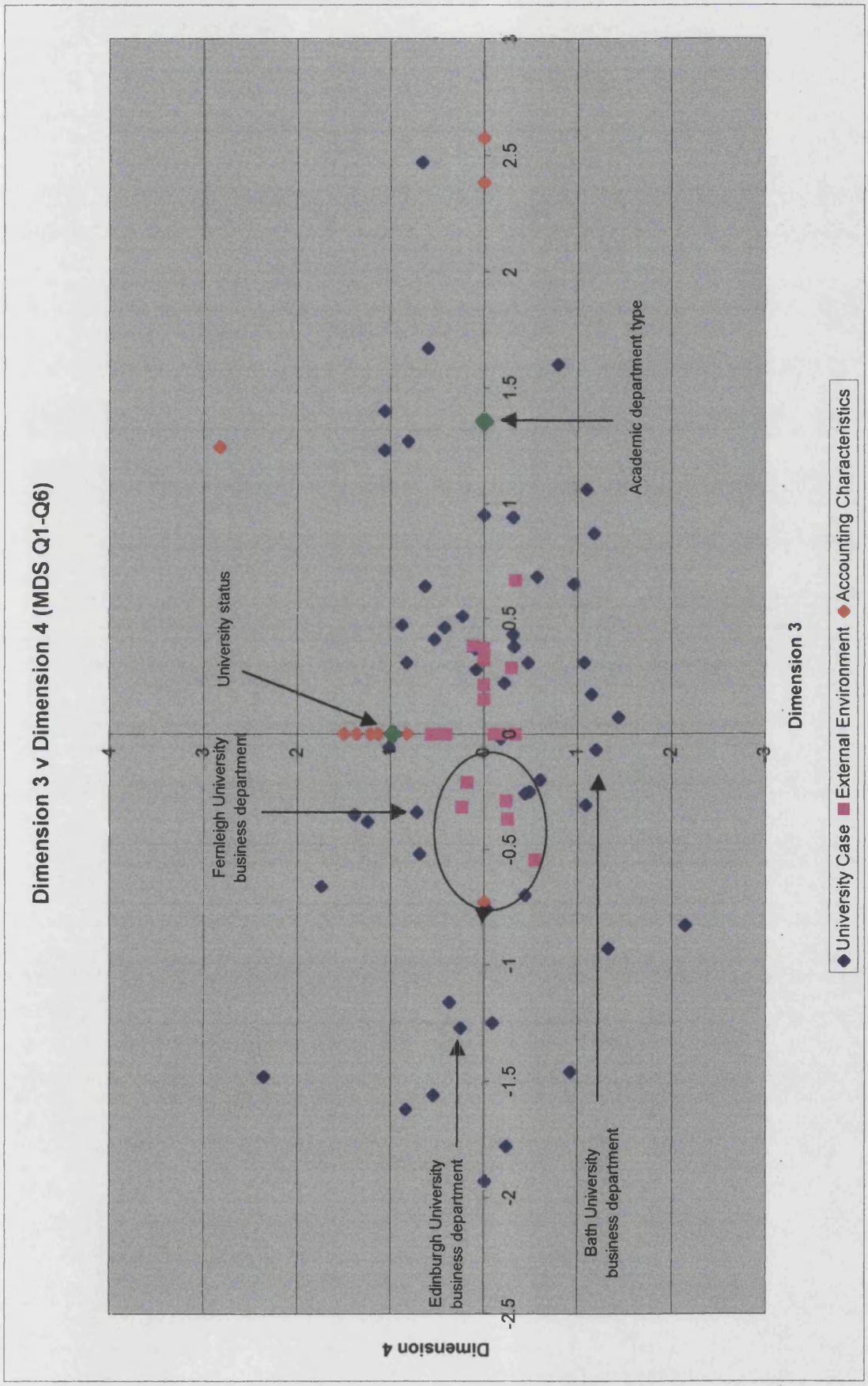
Northeast/ Southwest Direction

Q20ii-c AIS Change: Change in Accounting records to identify expenditure at the academic dept. level over time

Northeasterly direction...

Q1i Change of delivery of u/g course

Appendix II - C: Graphical representation of dimension 3 v dimension 4 (MDS External Environment – Q1-Q6)



Dimension 3 v Dimension 4 (MDS Q1-Q6)

South/ North Direction

Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iv Demand for research active staff for academic positions within your organisation
University status
Q30ii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses
Q30iii-c AIS Change: Academic dept keeping records of revenue and costs of research activity
Q30iv-c AIS Change: Academic dept keeping records of revenue and costs of other activity
Q20bi-c AIS Change: Expenditure budgets (non-pay) in existance at academic dept level
Q20biv-c AIS Change: Transfer of funds between budget heading permitted (virement)

Southerly direction...

Q2ii Use of IT to deliver p/g courses
Q3iib: Age profile of p/g
Q4ii Financial incentives offered to students to study on p/g courses
Q5ii Change of range of p/g courses
Q5v Change of range of electives on p/g courses
Q6iiic: Change of research requirements in terms of financial incentives offered to students registering for research

East/ West Direction

Q1i Change of delivery of u/g course
Q5i Change of range of u/g courses
Q5iii Change of range of other courses
Q5iv Change of range of electives on u/g courses (0.003) Dy, Ho
Q6iiia: Change of research requirements in terms of age profile of students registering for research
Category of academic department
Q3aii-c AIS Change: Change in the identification of financial incentives offer to students (Q4) at acad dept level
Q22i AIS Change: Acad dept more conscious of the direct costs it incurs now
Q31b-c: AIS Change: Effectiveness of financial incentives offered (Q4) reviewed at least annually

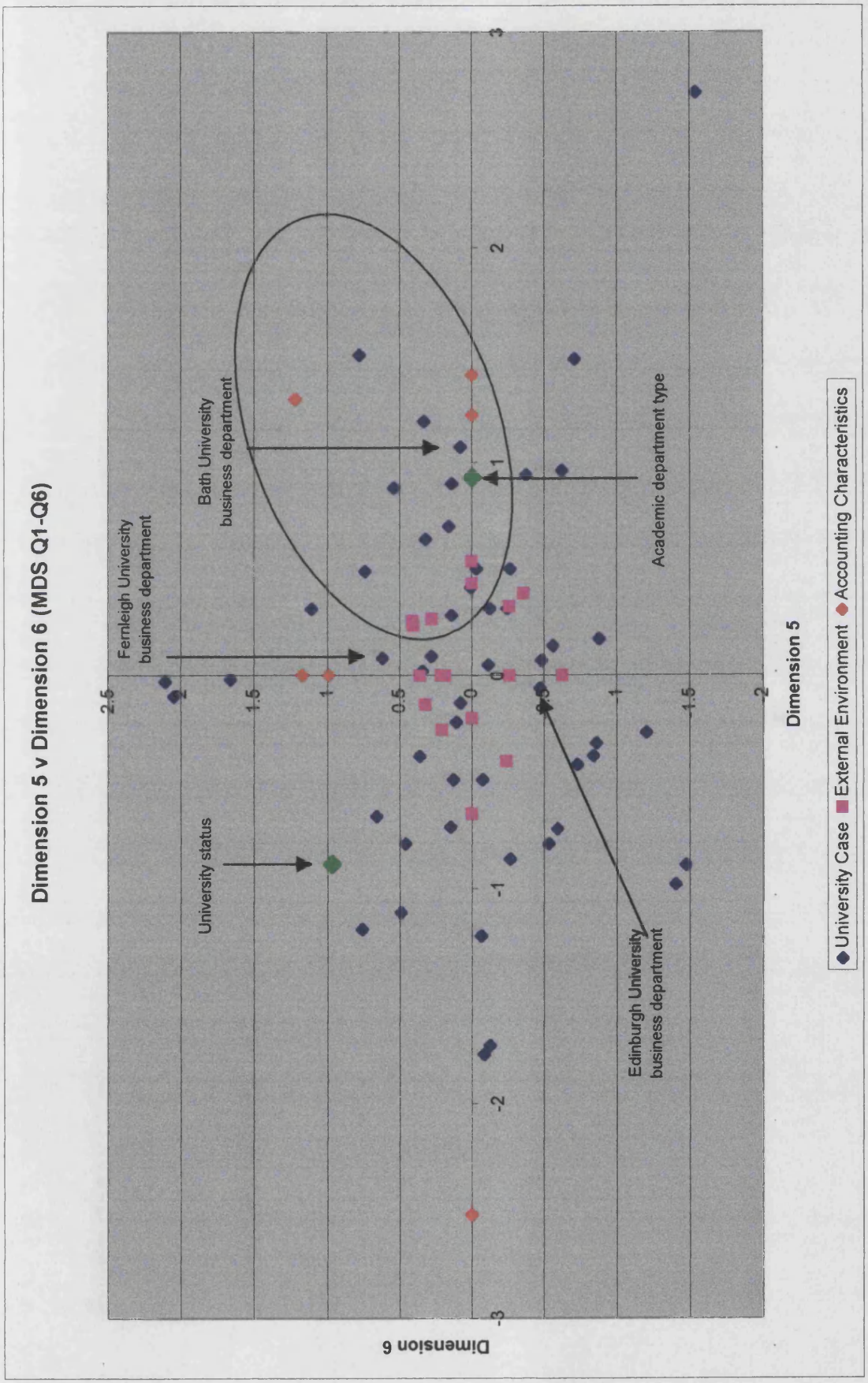
Westerly direction...

Q3i Entry details in terms of 'A' Level points for u/g (0.032)
Q3iiia Geographic catchment area of u/g (0.003) Dy, He
Q3iiib Geographic catchment area of p/g (0.004) Dy, He
Q3iva Application rate for places on u/g (0.000)
Q3ivb Application rate for places on p/g (0.022) Dy, He, Ho
Q20ai-c AIS Change: Change in Accounting records to identify revenue at the academic dept. level over time

Northeasterly Direction

Q27ii-c :AIS Change: Access acc reports from centralised records to show costs incurred on research projects

Appendix II - D: Graphical representation of dimension 5 v dimension 6 (MDS External Environment – Q1-Q6)



Dimension 5 v Dimension 6 (MDS Q1-Q6)

South/ North Direction

Q2ii: Use of IT to deliver p/g courses
Q6iiib: Change of research requirements in terms of number of students registering for research
Q6iv: Demand for research active staff for academic positions within your organisation
Q33a: AIS Change: General acceptance that budgetary devolution has been successful over the period
Q24v-c: AIS Change: Cost information of teaching and research is available at dept level.

Southerly direction…

Q1i Change of delivery of u/g course
Q5i: Change of range of u/g courses

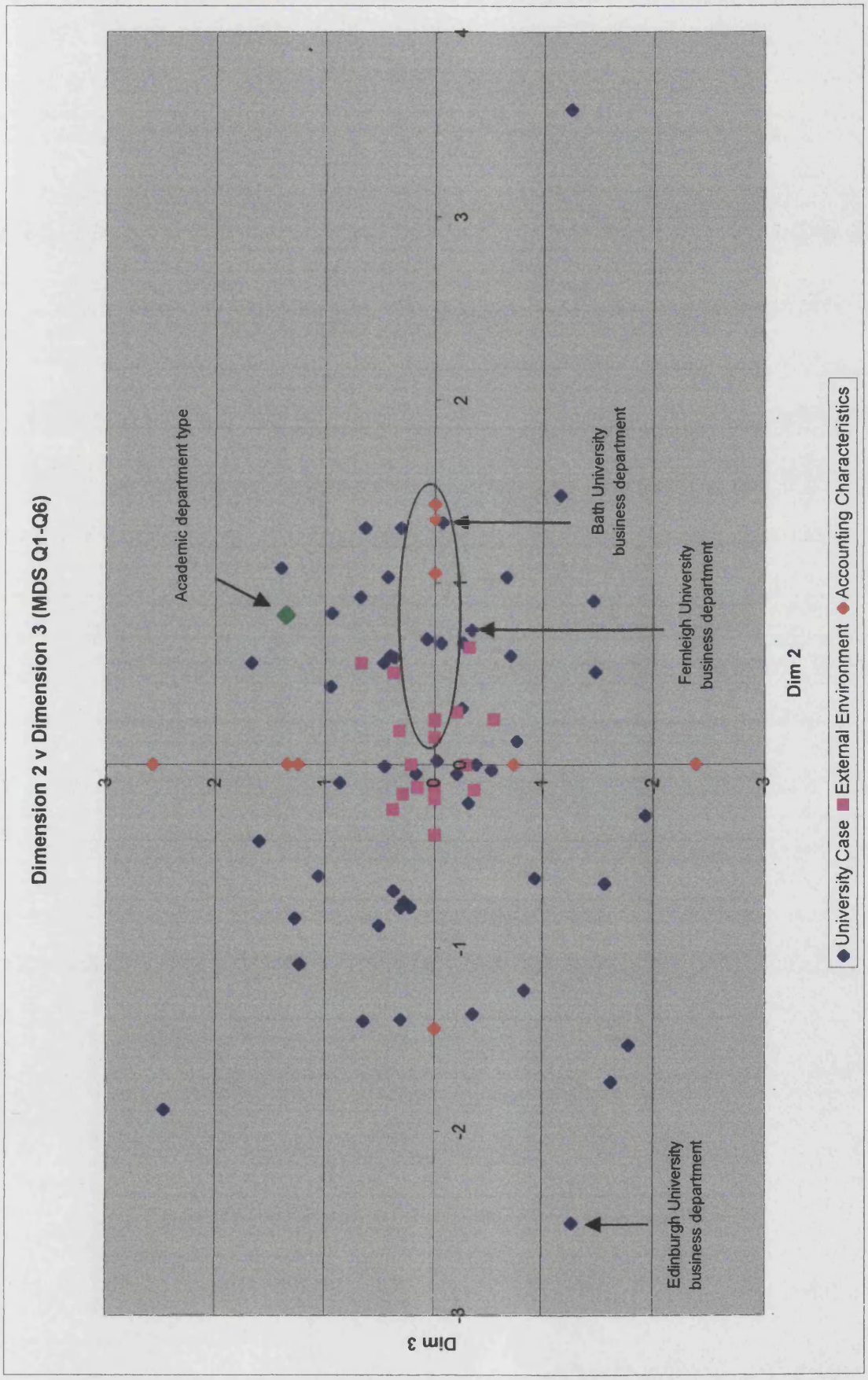
East/ West Direction

Q1ii Change of delivery of p/g course
Q3i : Entry details in terms of 'A' Level points for u/g
Q6i: Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6ii: Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research
Category of academic department
Q27i-c:AIS Change: Access acc reports from centralised records to show costs incurred on each course
Q30ai-c AIS Change: Academic dept keeping records of revenue and costs of ug courses
Q30aii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses

Westerly direction…

Q3iia: Age profile of u/g Dy, He
Q3iva: Application rate for places on u/g (0.000) Dy, He, Ho
Q20ii-c AIS Change: Change in Accounting records to identify expenditure at the academic dept. level over time

Appendix II - E: Graphical representation of dimension 2 v dimension 3 (MDS External Environment – Q1-Q6)



Dimension 2 v Dimension 3 (MDS Q1-Q6)

South/ North Direction

Q5i: Change of range of u/g courses
Q27ii-c:AIS Change: Access acc reports from centralised records to show costs incurred on research projects
Q30ii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses
Q31b-c: AIS Change: Effectiveness of financial incentives offered (Q4) reviewed at least annually

Southerly direction...

Q3iiia: Geographic catchment area of u/g
Q22i-c AIS Change: Acad dept more conscious of the direct costs it incurs now
Q20i-c AIS Change: Change in Accounting records to identify revenue at the academic dept. level over time

Northeasterly direction...

Q1i Change of delivery of u/g course
Q1ii Change of delivery of p/g course
Q5iii Change of range of other courses
Category of academic department

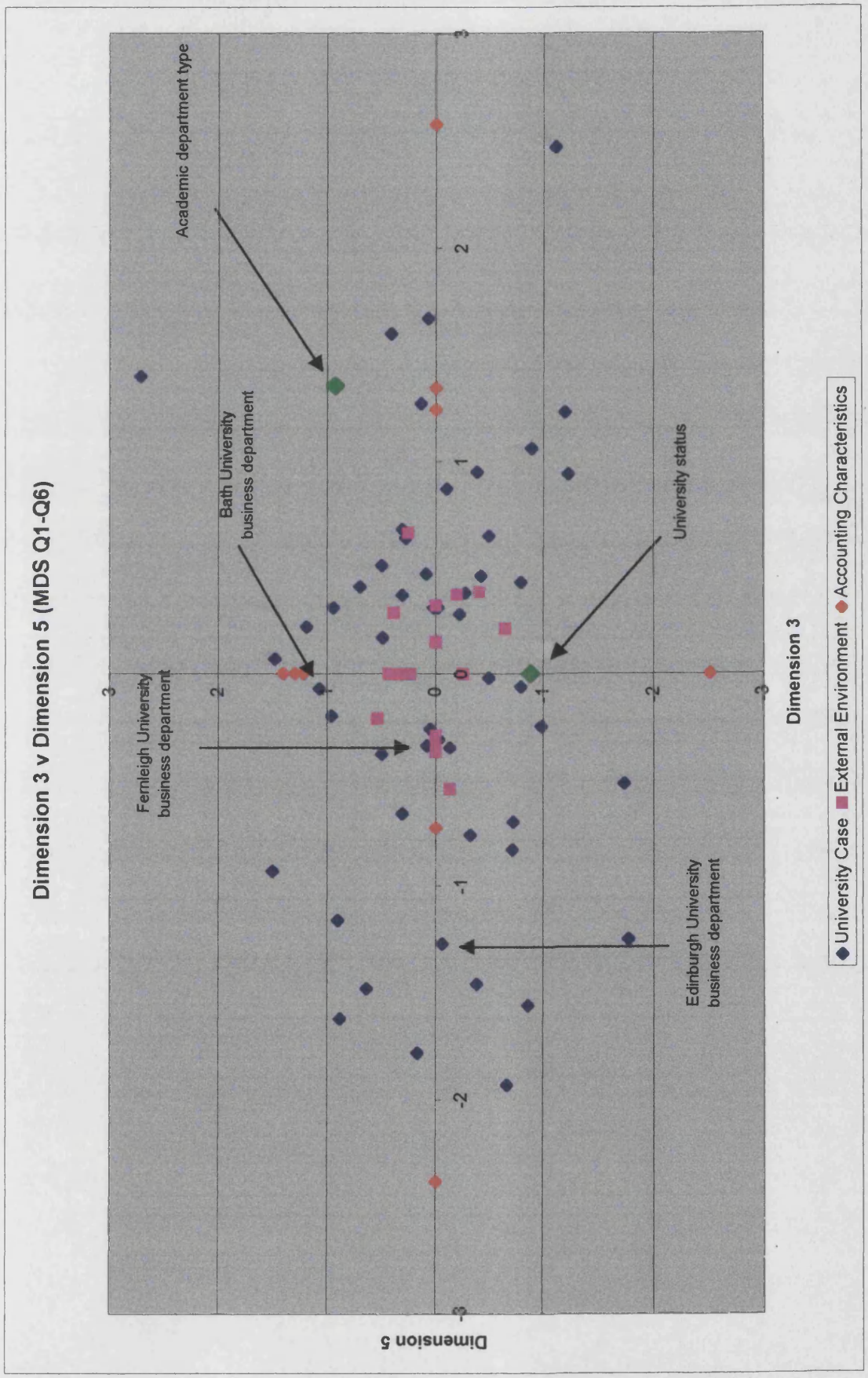
East/ West Direction (similar to D1vD2 - South/ North Direction)

Q2i: Use of IT to deliver u/g courses
Q2ii: Use of IT to deliver p/g courses
Q6iv: Demand for research active staff for academic positions within your organisation
Q30ai-c AIS Change: Academic dept keeping records of revenue and costs of ug courses
Q30aii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses
Q33b: AIS Change: Subsequent move to recentralise budgetary devolution

Easterly direction...

Q4ii: Financial incentives offered to students to study on p/g courses
Q6ii: Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iiib: Change of research requirements in terms of number of students registering for research
Q6iiic: Change of research requirements in terms of financial incentives offered to students registering for research
Q20ii-c AIS Change: Change in Accounting records to identify expenditure at the academic dept. level over time

Appendix II - F: Graphical representation of dimension 3 v dimension 5 (MDS External Environment – Q1-Q6)



Dimension 3 v Dimension 5 (MDS Q1-Q6)

South/ North Direction

Q4ii: Financial incentives offered to students to study on p/g courses
Q6i: Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6ii: Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iiic: Change of research requirements in terms of financial incentives offered to students registering for research
Q27i-c:AIS Change: Access acc reports from centralised records to show costs incurred on each course
Q30i-c AIS Change: Academic dept keeping records of revenue and costs of ug courses
Q30ii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses

Southerly direction...

Q5ii: Change of range of p/g courses
Q20ii-c AIS Change: Change in Accounting records to identify expenditure at the academic dept. level over time
University status

East/ West Direction

Q5iii: Change of range of other courses
Q6iiia: Change of research requirements in terms of age profile of students registering for research (0.006) Dy, He
Q27ii-c:AIS Change: Access acc reports from centralised records to show costs incurred on research projects
Q31ii-c AIS Change: Change in the identification of financial incentives offer to students (Q4) at acad dept level
Q31b-c: AIS Change: Effectiveness of financial incentives offered (Q4) reviewed at least annually

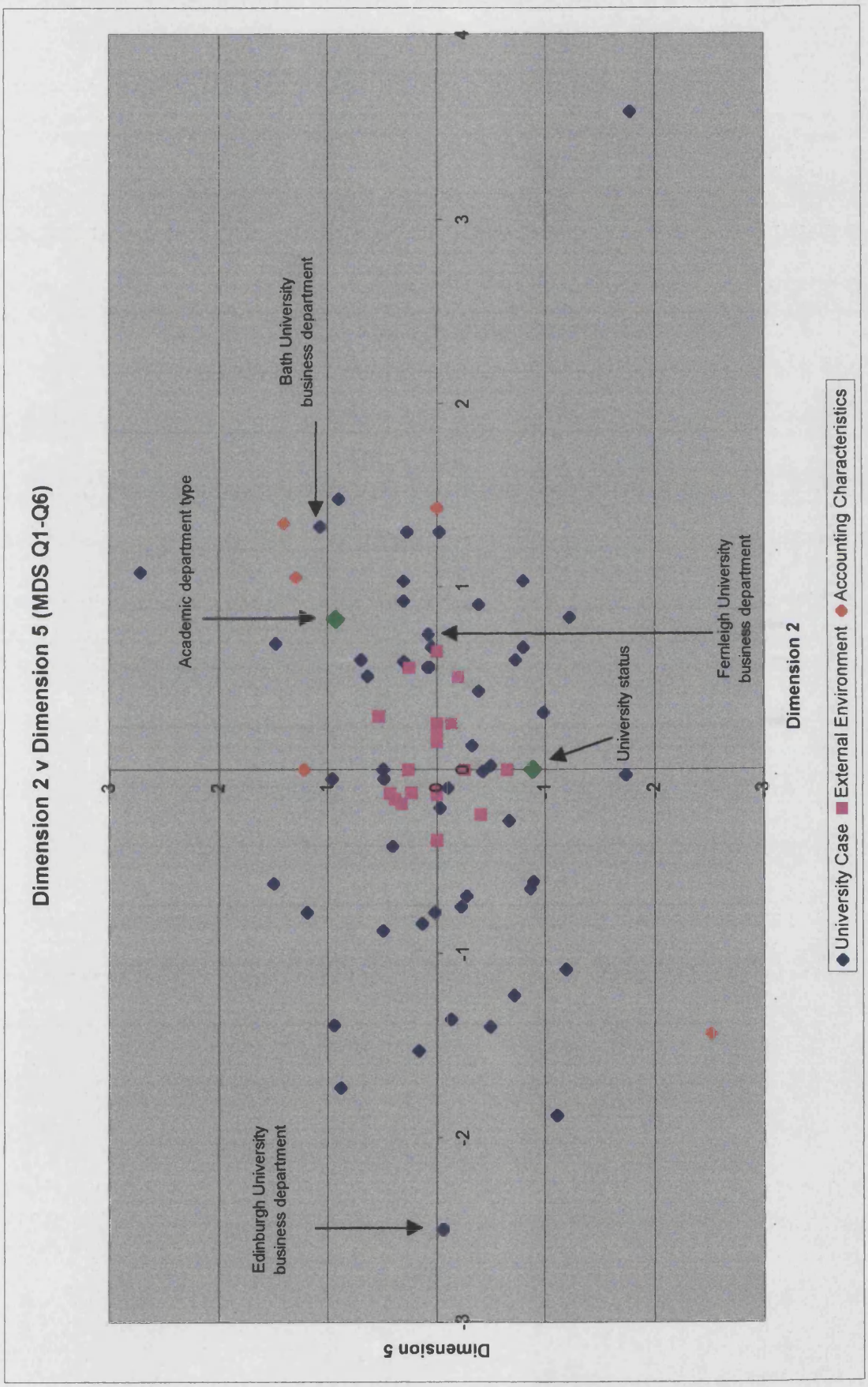
Westerly direction...

Q3iiia: Geographic catchment area of u/g
Q3iiib: Geographic catchment area of p/g
Q3iva: Application rate for places on u/g
Q22i AIS Change: Acad dept more conscious of the direct costs it incurs now
Q20i-c AIS Change: Change in Accounting records to identify revenue at the academic dept. level over time

Northeasterly direction...

Q1ii Change of delivery of p/g course
Q4i Financial incentives offered to students to study on u/g courses
Category of academic department

Appendix II - G: Graphical representation of dimension 2 v dimension 5 (MDS External Environment – Q1-Q6)



Dimension 2 v Dimension 5 (MDS Q1-Q6)

Southwest/ Northeast Direction

Q1ii Change of delivery of p/g course
Q3i Entry details in terms of 'A' Level points for u/g
Category of academic department
Q30i-c AIS Change: Academic dept keeping records of revenue and costs of ug courses
Q30ii-c AIS Change: Academic dept keeping records of revenue and costs of pg courses
Southwesterly direction...
Q5iv: Change of range of electives on u/g courses
Q20ii-c AIS Change: Change in Accounting records to identify expenditure at the academic dept. level over time

South/ North Direction

Q6i: Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q27i-c:AIS Change: Access acc reports from centralised records to show costs incurred on each course
Southerly direction...
Q5i: Change of range of u/g courses
Q5ii: Change of range of p/g courses
University status

West/ East Direction

Q2i: Use of IT to deliver u/g courses
Q2ii: Use of IT to deliver p/g courses
Q3iva: Application rate for places on u/g
Q5iii: Change of range of other courses
Q6iv: Demand for research active staff for academic positions within your organisation
Q33b: AIS Change: Subsequent move to recentralise budgetary devolution

Appendix II - H: Statistically significant questions regressed (ProFit/ Logit) into the MDS configuration map (broader contingent variables Q1-Q18)

ProFit Regression – Q1i

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	DIM6, DIM5, DIM3, DIM2, DIM4, DIM1[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Q1.1 Change of delivery of u/g course

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.634[a]	.402	.322	.80

a. Predictors: (Constant), DIM6, DIM5, DIM3, DIM2, DIM4, DIM1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.576	6	3.263	5.042	.000[a]
	Residual	29.117	45	.647		
	Total	48.692	51			

a. Predictors: (Constant), DIM6, DIM5, DIM3, DIM2, DIM4, DIM1

b. Dependent Variable: Q1.1 Change of delivery of u/g course

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.423	.112		30.687	.000
	DIM1	.266	.073	.422	3.655	.001
	DIM2	-1.25E-03	.099	-.001	-.013	.990
	DIM3	-.121	.128	-.109	-.946	.349
	DIM4	-.521	.143	-.419	-3.632	.001
	DIM5	.183	.155	.136	1.179	.245
	DIM6	.255	.162	.183	1.581	.121

a. Dependent Variable: Q1.1 Change of delivery of u/g course

Logit Regression – Q21b

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	9.808	6	.133
	Block	9.808	6	.133
	Model	9.808	6	.133

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	26.747	.257	.384

Classification Table[a]

			Predicted		
			Q21b: If o'heads are allocated to academic dept level, has the allocation method changed?		Percentage Correct
	Observed		0	yes	
Step 1	Q21b: If o'heads are allocated to academic dept level, has the allocation method changed?	0	4	4	50.0
		yes	1	24	96.0
	Overall Percentage				84.8

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	DIM1	1.575	.790	3.970	1	.046	4.830
	DIM2	-.386	.530	.531	1	.466	.679
	DIM3	-1.160	.686	2.860	1	.091	.313
	DIM4	1.233	.782	2.485	1	.115	3.432
	DIM5	-.274	.843	.106	1	.745	.760
	DIM6	1.511	1.040	2.111	1	.146	4.532
	Constant	2.012	.811	6.148	1	.013	7.479

a. Variable(s) entered on step 1: DIM1, DIM2, DIM3, DIM4, DIM5, DIM6.

Logit Regression – University status

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	20.142	6	.003
	Block	20.142	6	.003
	Model	20.142	6	.003

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	44.301	.343	.464

Classification Table[a]

			Predicted		
			New or Old University		
	Observed		Old University	New University	Percentage Correct
Step 1	New or Old University	Old University	14	5	73.7
		New University	5	24	82.8
	Overall Percentage				79.2

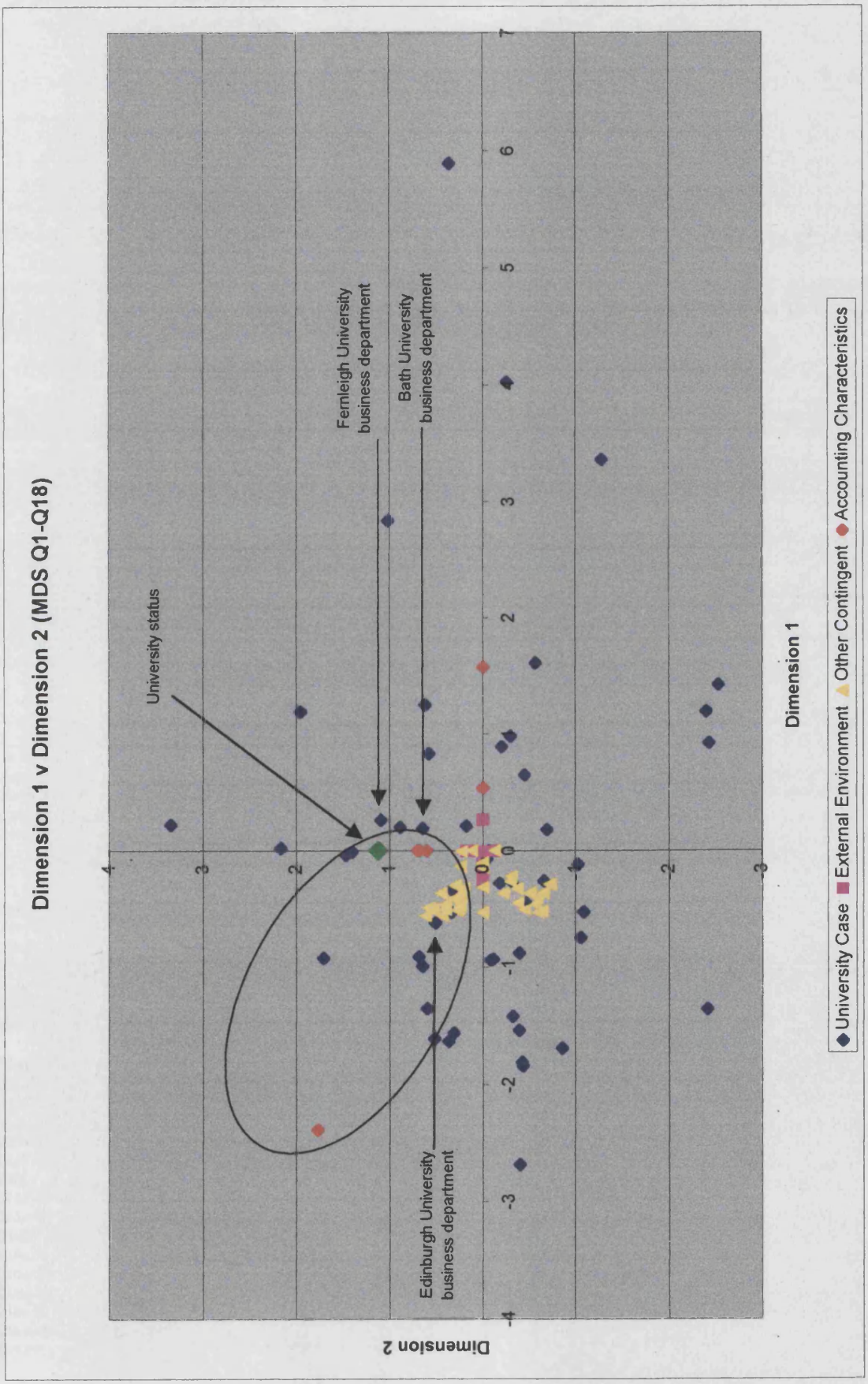
a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	DIM1	-.123	.210	.342	1	.559	.884
	DIM2	1.128	.475	5.637	1	.018	3.089
	DIM3	-1.233	.517	5.679	1	.017	.291
	DIM4	-1.362	.573	5.653	1	.017	.256
	DIM5	.289	.578	.251	1	.617	1.336
	DIM6	.782	.569	1.888	1	.169	2.187
	Constant	.789	.416	3.599	1	.058	2.202

a. Variable(s) entered on step 1: DIM1, DIM2, DIM3, DIM4, DIM5, DIM6.

Appendix Volume II, I: Graphical representation of dimension 1 v dimension 2 (MDS Broader Contingent – Q1-Q18)



Dimension 1 v Dimension 2 (MDS Q1-Q18)

North-Westerly Direction (as circled)

Q2ii Use of IT to deliver p/g courses
Q4ii Financial incentives offered to students to study on p/g courses
Q6iiia Change of research requirements in terms of age profile of students registering for research
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research
Q11 Impact of market research in the degree of change as indicated in Q1 - Q5
Q13ia.99 Influence over the appointment of full time academic staff now
Q13ib.99 Influence over the appointment of part time academic staff now
Q13ii.99 Influence over appointing administrative staff now
Q13iii.99 Influence over appointing support services (external to the university) now
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration now
Q14i.99 Approval to invest in IT for academic activities now
Q14ii.99 Approval to invest in IT for administration now
Q15i.99 Authority for u/g course development and implementation now
Q15ii.99 Authority for p/g course development and implementation now
Q15iii.99 Authority for other course development and implementation now
Q16i.99 Approval of travel expenditure (UK) now
Q16ii.99 Approval of travel expenditure (o'seas) now
Q16iii.99 Approval of overtime expenditure now
Q16iv.99 Approval of capital expenditures now
Q16v.99 Approval for conferences now
Q16vi.99 Approval of appointment of staff now
Q17 Increase of central support for increased research
Q19.99 Extent of HoD's responsibility for financial targets now
University status
Q20bi-c AIS Change: Staff budgets (pay costs) in existance at academic dept level
Q20biv-c AIS Change: Academic dept has considerable influence in the budget setting process
Q21c AIS Change: University overheads allocated to the academic dept level
Q29c: AIS Change - Possible to interrogate central accounting reports to produce reports other than standard
Q30ai-c AIS Change: Academic dept keeping records of revenue and costs of ug courses
Q30aiii-c AIS Change: Academic dept keeping records of revenue and costs of research activity

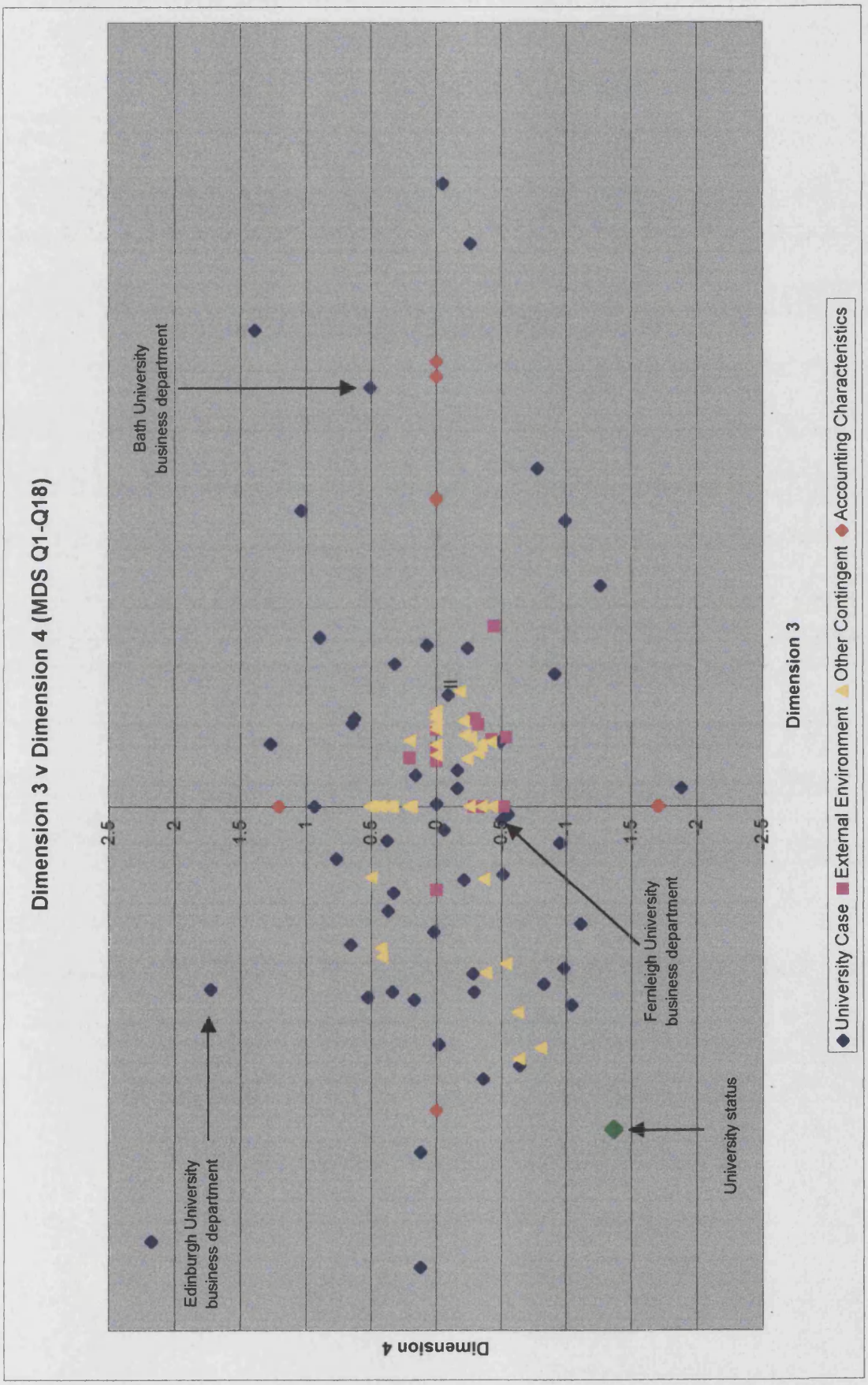
West/ East Direction

Q1i Change of delivery of u/g course
Q3iib Age profile of p/g
Q3iiia Geographic catchment area of u/g
Q3iiib Geographic catchment area of p/g
Q3ivb Application rate for places on p/g
Q5ii Change of range of p/g courses
Q5iv Change of range of electives on u/g courses
Q5v Change of range of electives on p/g courses
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding
Q7ivThe amount of formal developmental market research undertaken as to identify sources of external funding
Q8ii The amount of internal market research undertaken as to students views of p/g courses
Q13ib.90 Influence over the appointment of part time academic staff early 1990s
Q13ii.90 Influence over appointing administrative staff early 1990s
Q21b AIS Change: Allocation method over overheads changed over time
Q25i AIS Change: Change in the amount of academic time taken up through financial management in the academic department

South-Westerly Direction

Q13ia.90: Influence over the appointment of full time academic staff early 1990s
Q13iii.90: Influence over appointing support services (external to the university) early 1990s
Q13iv.90: Influence over the amount of remission on teaching to academic staff for research / administration early 1990s
Q14i.90: Approval to invest in IT for academic activities early 1990s
Q14ii.90: Approval to invest in IT for administration early 1990s
Q15i.90 Authority for u/g course development and implementation early 1990s
Q15ii.90 Authority for p/g course development and implementation early 1990s
Q15iii.90 Authority for other course development and implementation early 1990s
Q16i.90 Approval of travel expenditure (UK) 1900s
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s
Q16iii.90 Approval of overtime expenditure early 1990s
Q16iv.90 Approval of capital expenditures early 1990s
Q16v.90 Approval of conferences early 1990s
Q16vi.90 Approval of appointment of staff early 1990s
Q19.90: Extent of HoD's responsibility for financial targets in early 1990s

Appendix Volume II, J: Graphical representation of dimension 3 v dimension 4 (MDS Broader Contingent – Q1-Q18)



Dimension 3 v Dimension 4 (MDS Q1-Q18)

South-Westerly Direction

Q15i.90 Authority for u/g course development and implementation early 1990s
Q15i.99 Authority for u/g course development and implementation now
Q15ii.90 Authority for p/g course development and implementation early 1990s
Q15ii.99 Authority for p/g course development and implementation now
Q15iii.90 Authority for other course development and implementation early 1990s
Q15iii.99 Authority for other course development and implementation now
University status

South/ North Direction

Q13iii.90 Influence over appointing support services (external to the university) early 1990s
Q13iii.99 Influence over appointing support services (external to the university) now
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration now
Q14i.90 Approval to invest in IT for academic activities early 1990s
Q14i.99 Approval to invest in IT for academic activities now
Q16v.99 Approval for conferences now
Q16v.90 Approval of conferences early 1990s
Q19.90 Extent of HoD's responsibility for financial targets in early 1990s
Q25i-c AIS Change: Change in the proportion of academic time taken up through financial management in the acad dept.

Southerly direction...

Q1i Change of delivery of u/g course
Q5iv Change of range of electives on u/g courses
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q8iii The amount of internal market research undertaken as to students requirements of the University
Q13ib.90 Influence over the appointment of part time academic staff early 1990s
Q13ib.99 Influence over the appointment of part time academic staff now
Q20bii-c AIS Change: Expenditure budegts (non-pay) in existance at academic dept level
Q23ii-c AIS Change: Income from research grants allocated to academic dept level

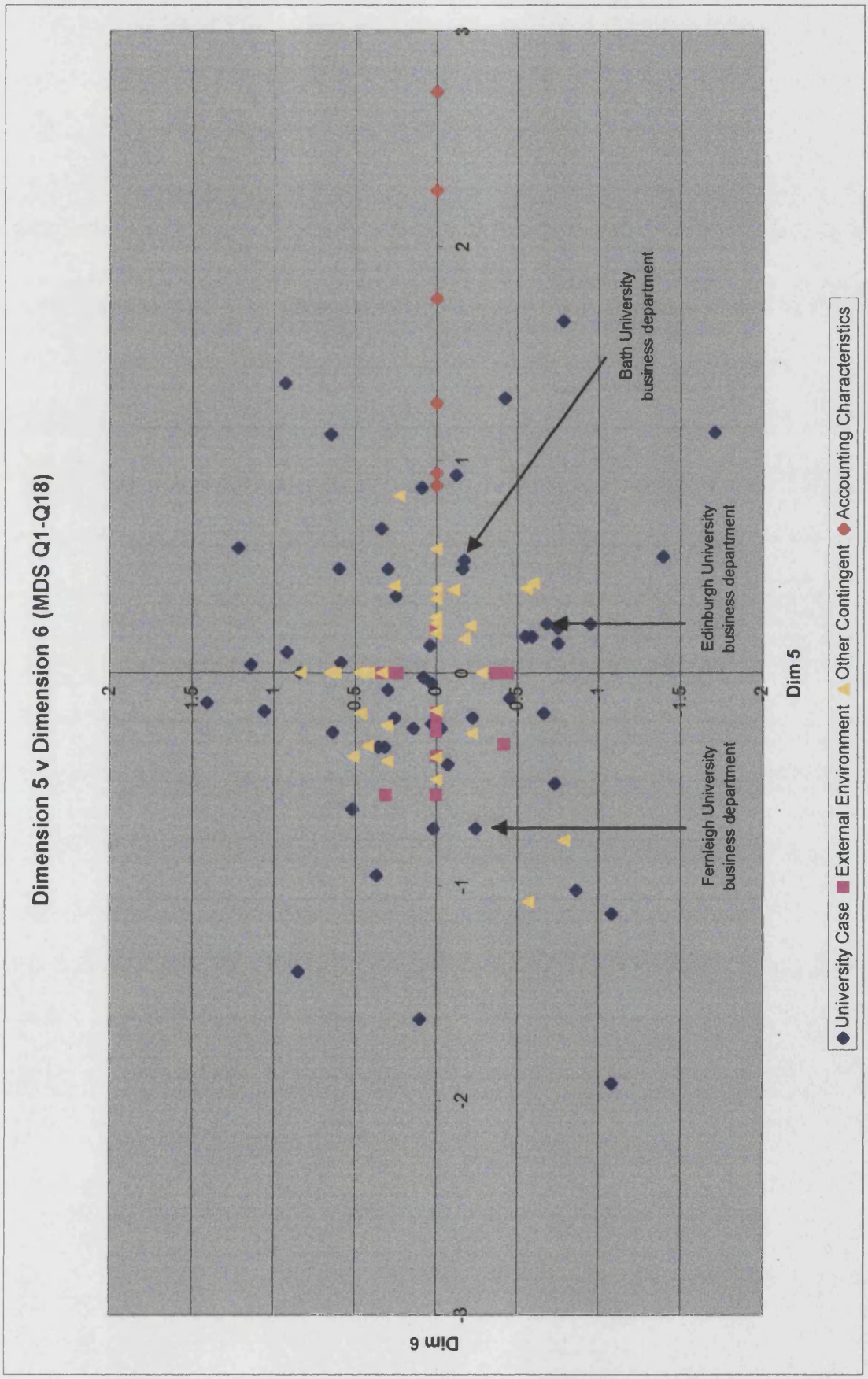
West/ East Direction

Q3i Entry details in terms of 'A' Level points for u/g
Q4ai Financial incentives offered to students to study on u/g courses
Q6iii-c: Change of research requirements in terms of financial incentives offered to students registering for research
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision
Q14i Approval to invest in IT for academic activities early 1990s
Q16i Approval of travel expenditure (UK) early 1990s
Q16ii Approval of travel expenditure (o'seas) early 1990s
Q16iv Approval of capital expenditures now
Q16vi Approval of appointment of staff now
Q24v-c AIS Change: Financial information (costs of T & R) available at academic dept level
Q29-c AIS Change: Possible to interrogate central acc reports to produce reports other than standard
Q31aii-c AIS Change: Financial incentives offered to students in Q4 clearly identified at the acad dept level
Q31aiii-c AIS Change: Financial incentives offered to students in Q4 clearly identified at the course level

Westerly direction

Q6iiib Change of research requirements in terms of number of students registering for research
Q21b-c AIS Change: Allocation method of overhead charge to acad dept changed

Appendix Volume II, K: Graphical representation of dimension 5 v dimension 6 (MDS Broader Contingent – Q1-Q18)



Dimension 5 v Dimension 6 (MDS Q1-Q18)

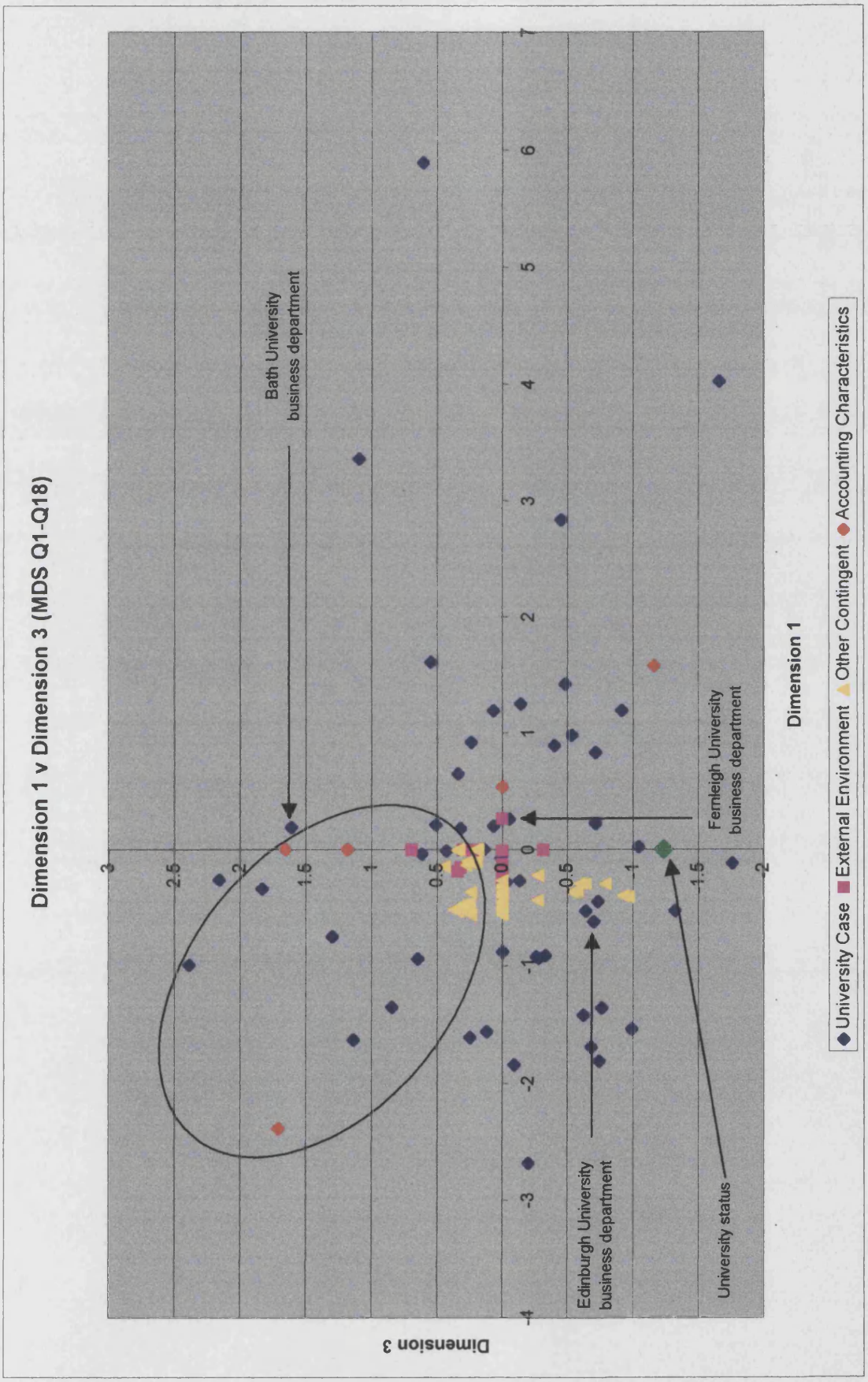
Easterly Direction

Q2i Use of IT to deliver u/g courses
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision
Q13ia.99 Influence over the appointment of full time academic staff now
Q13ib.99 Influence over the appointment of part time academic staff now
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration now
Q15ii.90 Authority for p/g course development and implementation early 1990s
Q15iii.90 Authority for other course development and implementation early 1990s
Q22ii-c AIS Change: Acad dept more conscious of the direct costs it incurs now
Q24i-c AIS Change: Centralised acc function provides financial info concerning direct costs of teaching
Q24iii-c AIS Change: Centralised acc function provides financial info concerning full costs of teaching
Q24iv-c AIS Change: Centralised acc function provides financial info concerning full costs of research
Q29-c AIS Change: Possible to interogate central acc reports in order to produce reoprts other than standard
Q34 AIS Change: Transfer pricing policies been developed as a result of budgetary devolution

Westerly direction...

Q3iib Age profile of p/g
Q5iv Change of range of electives on u/g courses
Q5v Change of range of electives on p/g courses
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6iiib Change of research requirements in terms of number of students registering for research
Q7iv:The amount of formal developmental market research undertaken as to identify sources of external funding
Q11 Impact of market research in the degree of change as indicated in Q1 - Q5
Q13ii.90 Influence over appointing administrative staff early 1990s

Appendix Volume II, L: Graphical representation of dimension 1 v dimension 3 (MDS Broader Contingent – Q1-Q18)



Dimension 1 v Dimension 3 (MDS Q1-Q18)

North-Westerly Direction

Q5v Change of range of electives on p/g courses
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q7i The amount of formal developmental market research undertaken as to stakeholders requirements of u/g courses
Q7iii The amount of formal developmental market research undertaken as to identify sources of research funding
Q7iv The amount of formal developmental market research undertaken as to identify sources of external funding
Q8ii The amount of internal market research undertaken as to students views of p/g courses
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision
Q10ii Change in the amount of formal evaluation of what other universities are doing in similar areas of research
Q13ia.99 Influence over the appointment of full time academic staff now
Q14i.90 Approval to invest in IT for academic activities early 1990s
Q16i.90 Approval of travel expenditure (UK) early 1990s
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s
Q16iv.90 Approval of capital expenditures early 1990s
Q16iv.99 Approval of capital expenditures now
Q16vi.99 Approval of appointment of staff now
Q16vi.90 Approval of appointment of staff early 1990s
Q29-c AIS Change - Possible to interrogate central accounting reports to produce reports other than standard

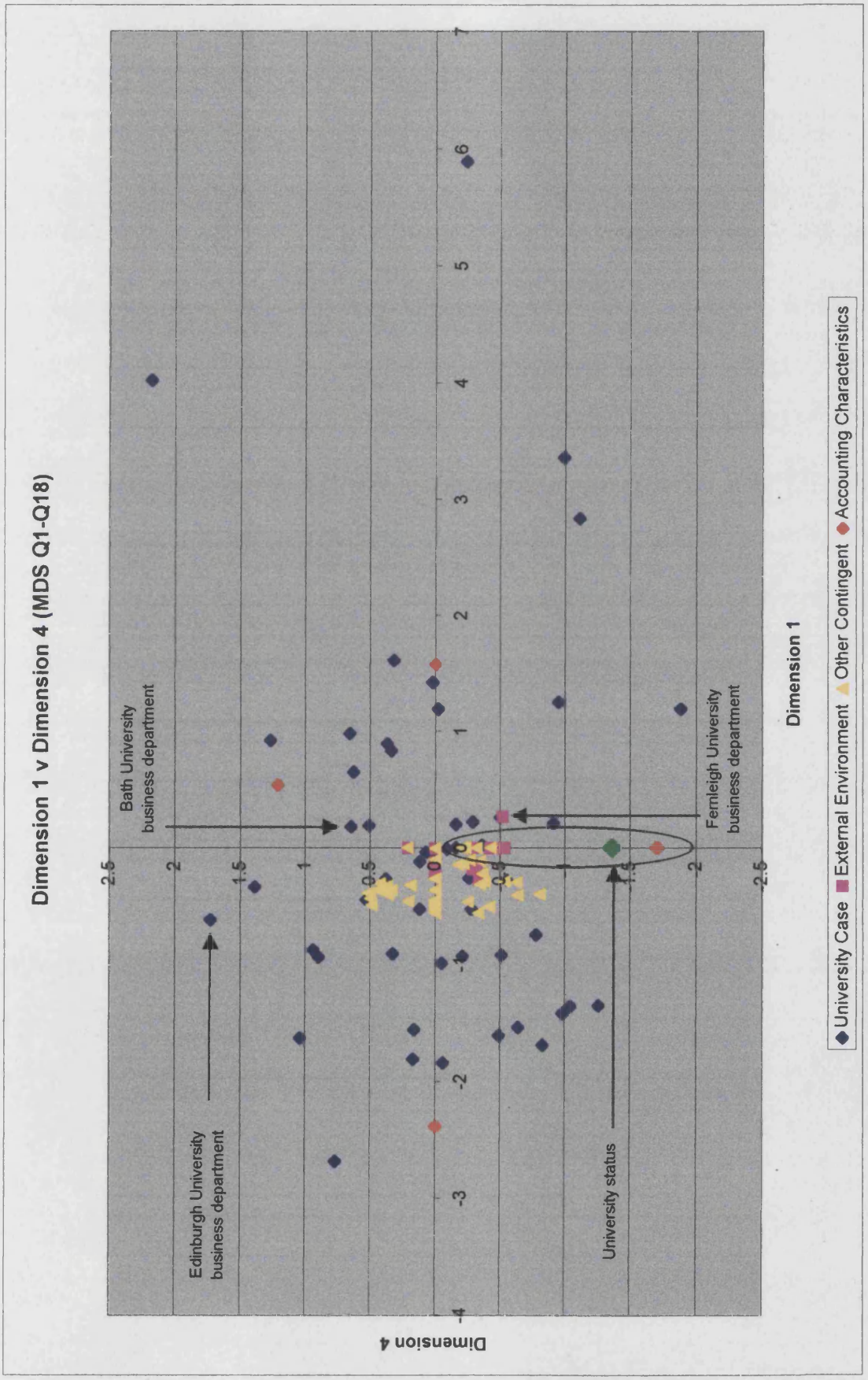
South/ North Direction

Q1ii Change of delivery of p/g course
Q3i Entry details in terms of 'A' Level points for u/g
Q3iva Application rate for places on u/g
Q4ai Financial incentives offered to students to study on u/g courses
Q4aii Financial incentives offered to students to study on p/g courses
Q6iiic Change of research requirements in terms of financial incentives offered to students registering for research
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses
Q8i The amount of internal market research undertaken as to students views of u/g courses
Q11 Impact of market research in the degree of change as indicated in Q1 - Q5
Q24v-c AIS Change: Change in the availability of data at the acad dept level (costs of t & r from centralised accounts)
Q31aii-c AIS Change: Change in the identification of financial incentives offer to students (Q4) at acad dept level
Q31aiii-c AIS Change: Change in the identification of financial incentives offer to students (Q4) at course level

West/ East Direction

Q1i Change of delivery of u/g course
Q25i AIS Change: Change in the amount of academic time taken up through financial management in the academic department

Appendix Volume II, M: Graphical representation of dimension 1 v dimension 4 (MDS Broader Contingent – Q1-Q18)

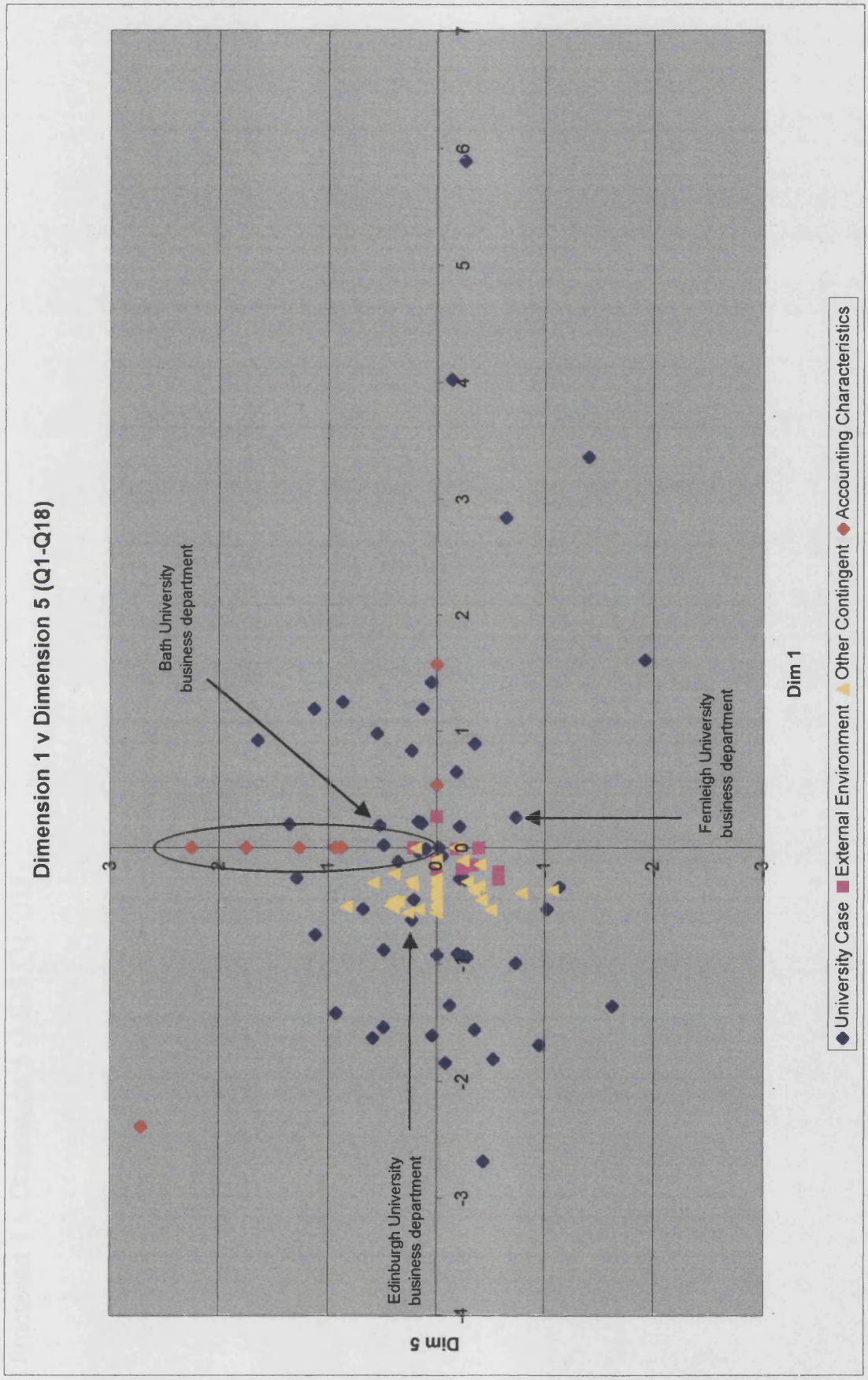


Dimension 1 v Dimension 4 (MDS Q1-Q18)

Southerly Direction

Q1ii Change of delivery of p/g course
Q3iva Application rate for places on u/g
Q4aii Financial incentives offered to students to study on p/g courses
Q6ii Change of research requirements in terms of proportion of staff actively undertaking research for RAE relevant output
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation
Q11 Impact of market research in the degree of change as indicated in Q1 - Q5
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses
Q8i The amount of internal market research undertaken as to students views of u/g courses
Q8iii The amount of internal market research undertaken as to students requirements of the University
Q20bii-c AIS Change: Expenditure budegts (non-pay) in existance at academic dept level
Q23ii-c AIS Change: Income from research grants allocated to academic dept level

Appendix Volume II, N: Graphical representation of dimension 1 v dimension 5 (MDS Broader Contingent – Q1-Q18)



Dimension 1 v Dimension 5 (MDS Q1-Q18)

Northerly Direction

Q2i Use of IT to deliver u/g courses

Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision

Q24i-c AIS Change: Centralised acc function provides financial info concerning direct costs of teaching

Q24iii-c AIS Change: Centralised acc function provides financial info concerning full costs of teaching

Q24iv-c AIS Change: Centralised acc function provides financial info concerning full costs of research

Q22ii AIS Change: Acad dept more conscious of the direct costs it incurs now

Q34 AIS Change: Transfer pricing policies been developed as a result of budgetary devolution

Appendix II - O: Statistically significant questions regressed (ProFit/ Logit) into the MDS configuration map (broader contingent variables Q2-Q14) for the General University Management.

ProFit Regression – Q5i

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	DIM5, DIM3, DIM1, DIM4, DIM2[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Q5.1: Change of range of u/g courses

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.514[a]	.264	.111	.63

a. Predictors: (Constant), DIM5, DIM3, DIM1, DIM4, DIM2

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.422	5	.684	1.721	.168[a]
	Residual	9.544	24	.398		
	Total	12.966	29			

a. Predictors: (Constant), DIM5, DIM3, DIM1, DIM4, DIM2

b. Dependent Variable: Q5.1: Change of range of u/g courses

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.966	.115		34.444	.000
	DIM1	.164	.078	.369	2.108	.046
	DIM2	-.180	.104	-.304	-1.727	.097
	DIM3	7.353E-03	.133	.010	.055	.956
	DIM4	7.366E-02	.174	.074	.423	.676
	DIM5	-.163	.188	-.153	-.868	.394

a. Dependent Variable: Q5.1: Change of range of u/g courses

Logit Regression – Q25i

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	4.147	5	.528
	Block	4.147	5	.528
	Model	4.147	5	.528

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	22.130	.138	.226

Classification Table[a]

			Predicted		
			Q25.1: Change in the proportion of academic time taken up through financial management in the academic dept		Percentage Correct
	Observed		0	yes	
Step 1	Q25.1: Change in the proportion of academic time taken up through financial management in the academic dept	0	1	4	20.0
		yes	0	23	100.0
	Overall Percentage				85.7

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	DIM1	-.066	.369	.032	1	.858	.936
	DIM2	-.209	.548	.146	1	.702	.811
	DIM3	-.004	.664	.000	1	.995	.996
	DIM4	.495	.788	.394	1	.530	1.640
	DIM5	1.451	.856	2.874	1	.090	4.268
	Constant	1.771	.587	9.100	1	.003	5.875

a. Variable(s) entered on step 1: DIM1, DIM2, DIM3, DIM4, DIM5.

Logit Regression – University Status

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	13.044	5	.023
	Block	13.044	5	.023
	Model	13.044	5	.023

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	28.411	.353	.471

Classification Table[a]

			Predicted		
			Old or New University		
	Observed		Old University	New University	Percentage Correct
Step 1	Old or New University	Old University	11	5	68.8
		New University	5	9	64.3
	Overall Percentage				66.7

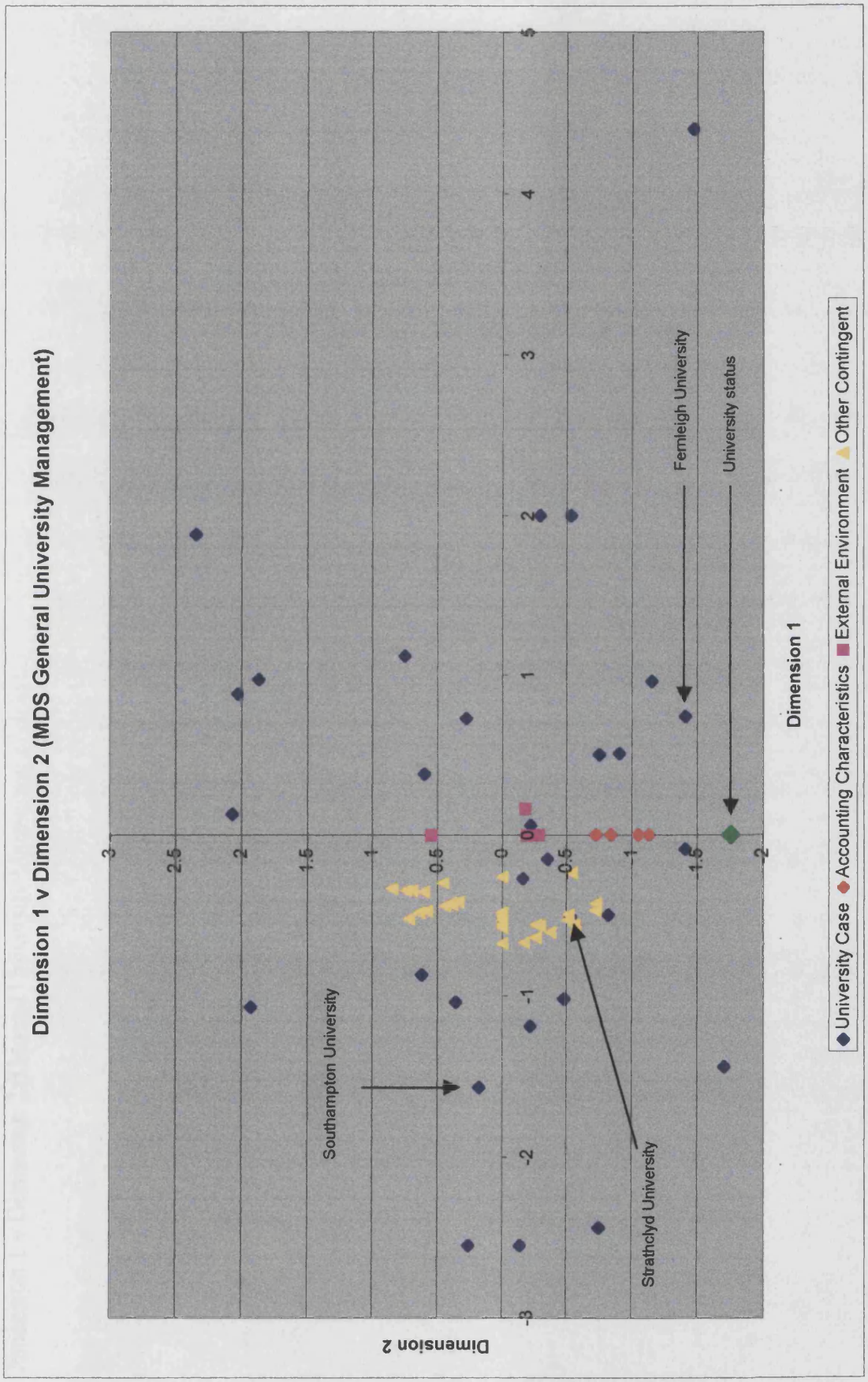
a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	DIM1	-.020	.320	.004	1	.950	.980
	DIM2	-1.760	.818	4.634	1	.031	.172
	DIM3	-1.030	.914	1.269	1	.260	.357
	DIM4	.812	.693	1.373	1	.241	2.252
	DIM5	-.587	.780	.567	1	.452	.556
	Constant	-.502	.580	.748	1	.387	.606

a. Variable(s) entered on step 1: DIM1, DIM2, DIM3, DIM4, DIM5.

Appendix II - P: Graphical representation of dimension 1 v dimension 2 (MDS General University Management – Q2-Q14)

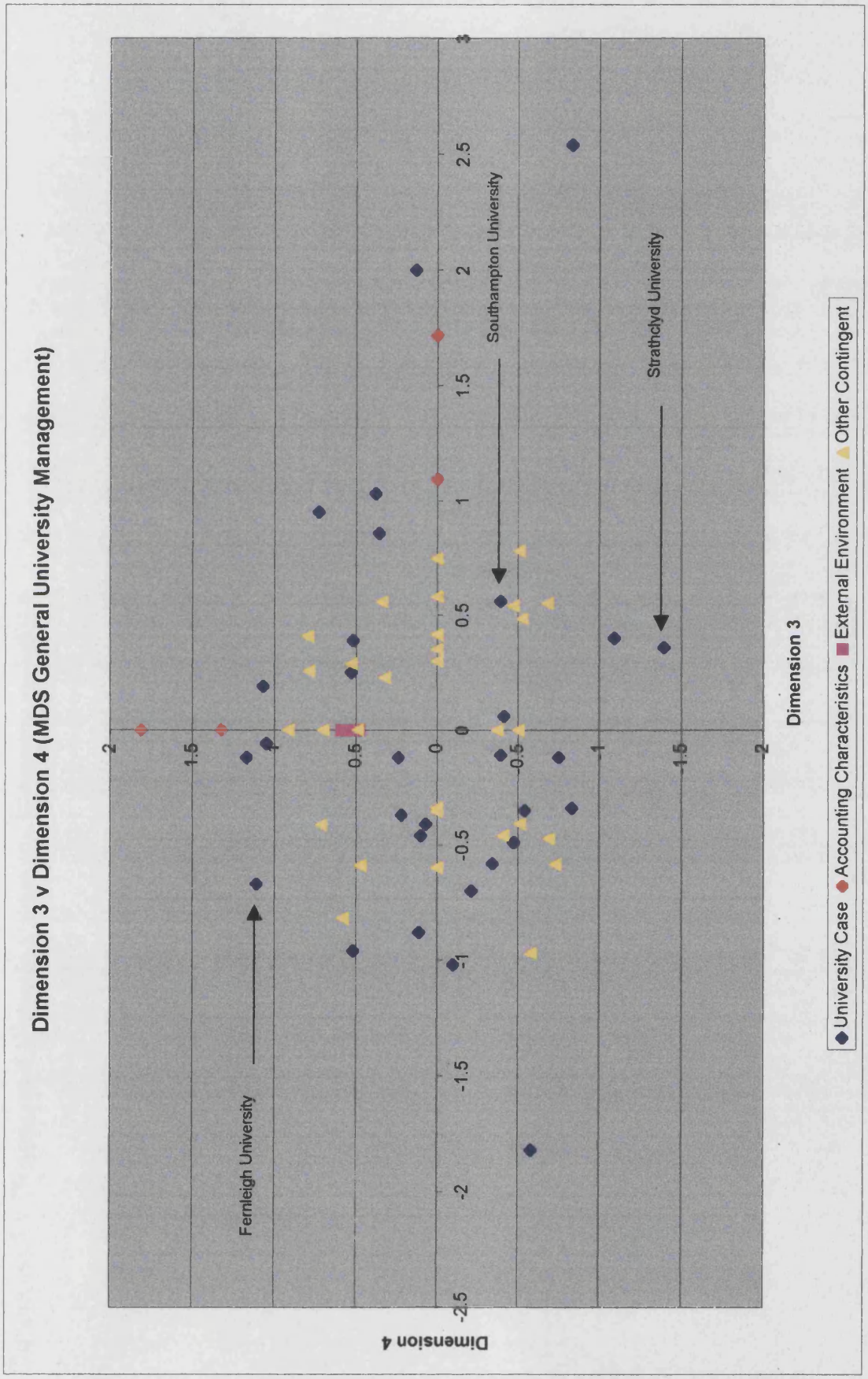


Dimension 1 v Dimension 2 (General University Management MDS)

North/ South Direction

Q5iv Change of range of electives on u/g courses
Q5v Change of range of electives on p/g courses
Q6ii Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6iv Change of research requirements in terms of the demand for reserach active staff for academic positions within your organisation
University status
Q21-c Accounting change: Overheads are now allocated to the academic dept. level (not in 1990's)
Q26i Allocation of additional resources to fulfil requirement of responsibility for financial targets
Q32bi Bottlenecks led to a proactive plan in terms of the level of teaching
Q32bii Bottlenecks led to a proactive plan in terms of the level of research

Appendix II - Q: Graphical representation of dimension 3 v dimension 4 (MDS General University Management – Q2-Q14)



Dimension 3 v Dimension 4 (General University Management MDS)

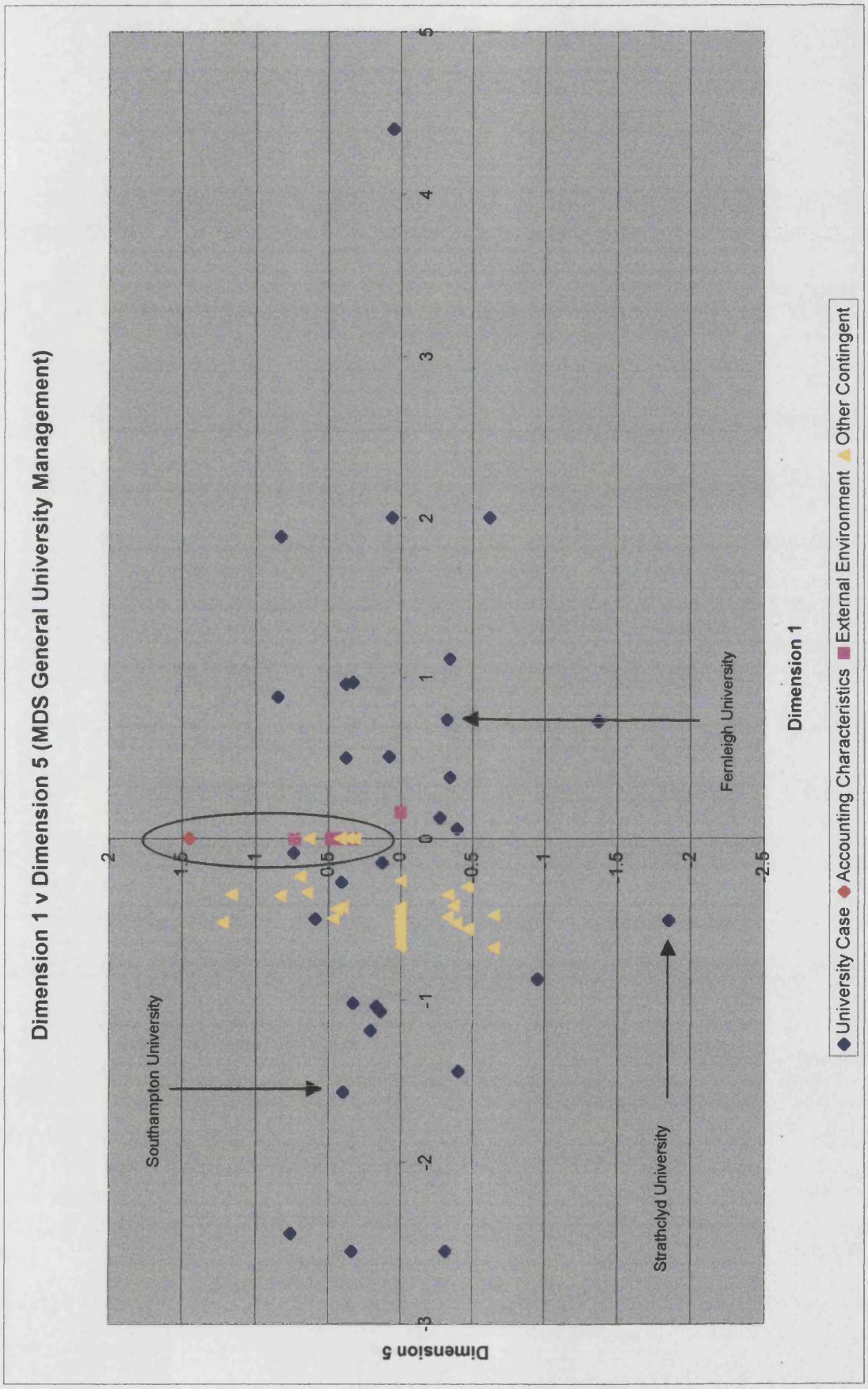
South/ North Direction

Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6ii Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6iv Change of research requirements in terms of the demand for research active staff for academic positions within your organisation
Q13iv.99 Influence over the amount of remission on teaching to academic staff for research / administration now
Q16iii.99 Approval of overtime expenditure now
Q16vi.99 Approval of appointment of staff now
Q20biii-c Influence now of academic dept in the budget setting process (not in the early 1990s)
Q22ii Academic dept more conscious of the full costs it incurs now

West/ East Direction

Q15ii.99 Authority for p/g course development and implementation now
Q15iii.99 Authority for other course development and implementation now
Q16ii.90 Approval of travel expenditure (o'seas) early 1990s
Q16iv.99 Approval of capital expenditures now
Q16v.99 Approval of conferences early 1990s
Q28-c Accounting function is now prepared to create accounting reports in different formats (not in early 1990's) (0.071)
Q28(g.u.m.)-c: Change to the accounting function providing the only support in appraising projects that require resources.

Appendix II - R: Graphical representation of dimension 1 v dimension 5 (MDS General University Management – Q2-Q14)



Dimension 1 v Dimension 5 (General University Management MDS)

North/ North-westerly Direction (as circled)

Q5v Change of range of electives on p/g courses
Q6i Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6ii Change of research requirements in terms of proportion of staff actively undertaking externally funded research
Q6iv Change of research requirements in terms of the demand for reserach active staff for academic positions within your organisation
Q7ii The amount of formal developmental market research undertaken as to stakeholders requirements of p/g courses
Q8ii The amount of internal market research undertaken as to students views of p/g courses
Q8iii The amount of internal market research undertaken as to students requirements of the University
Q10i Change in the amount of formal evaluation of what other universities are doing in similar areas of course provision
Q14i Approval to invest in IT for academic activities now
Q14i.90 Approval to invest in IT for academic activities early 1990s
Q14ii.90 Approval to invest in IT for administration early 1990s
Q15i.90 Authority for u/g course development and implementation early 1990s
Q15i.99 Authority for u/g course development and implementation now
Q16iv.90 Approval of capital expenditures early 1990s
Q16iv.99 Approval of capital expenditures now
Q16vi.99 Approval of appointment of staff now
Q25i Change in the proportion of academic time taken up through financial management in the academic dept